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ABSTRACT

This statistical and research supplement to the 2000-01 "Occupational Outlook Handbook" presents detailed, national, comprehensive statistics used in preparing the handbook. It also discusses recent research results and other topics valuable to training officials, education planners, vocational and employment counselors, job-seekers, and others interested in occupational information. Each topic is addressed separately in five chapters. Chapter 1 surveys secondary job data from the Current Population Survey that now are included in total employment estimates, while Chapter 2 presents detailed information about all occupations in the national industry-occupation matrix. In addition to statistics on employment and employment changes, growth rates, job openings, and self-employed workers, rankings from very low to very high for a number of variables are provided in a table in this chapter. The chapter also identifies the most significant source of education or training category designated for each occupation. Chapter 3 presents information about the factors affecting each of these categories. The concept of replacement needs is discussed in Chapter 4. The chapter defines what the data on replacement needs represent and describes how they were prepared. Projected replacement rates and estimates of replacement needs for 1998-2008 also are included. Finally, data from the National Center for Education Statistics on completions of institutional education and training programs by field of study appear in Chapter 5. The data described in the report are presented in 11 tables and a figure. (KC)

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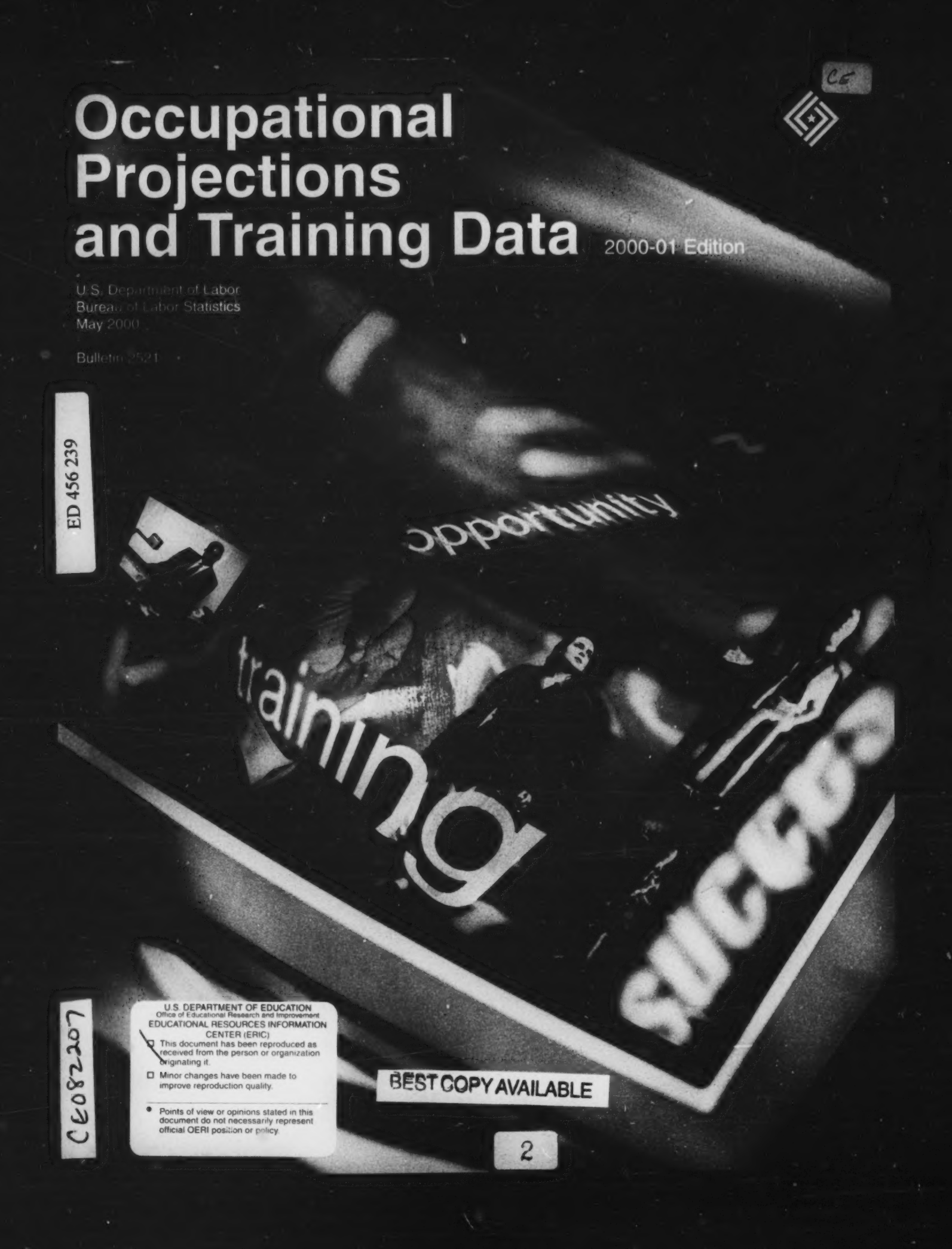

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Occupational Projections and Training Data

2000-01 Edition

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Preface

This statistical and research supplement to the 2000-01 *Occupational Outlook Handbook* presents detailed, comprehensive statistics used in preparing the *Handbook*. It also discusses recent research results and other topics—information that is valuable to training officials, education planners, vocational and employment counselors, jobseekers, and others interested in occupational information. Each topic is addressed in a separate chapter. This edition of the supplement is the 15th in a series dating back to 1971.

Chapter I discusses secondary job data from the Current Population Survey (CPS) that now are included in total employment estimates. Most occupational employment data used in preparing the Bureau of Labor Statistics' occupational projections are based on the Occupational Employment Statistics (OES) survey. OES survey data, which are collected from establishments, measure wage and salary jobs. To provide a more comprehensive employment estimate; self-employed, and unpaid family worker employment information from the CPS is combined with the OES survey based data. In the past, however, the CPS employment data only included primary job information. With the addition of secondary job information, CPS employment data provide a better measure of jobs and are more consistent with OES survey based job estimates.

Chapter II presents detailed information about all occupations in the national industry-occupation matrix. In addition to statistics on employment and employment changes, growth rates, job openings, and self-employed workers, table 2 includes rankings from very low to very high for a number of variables. It also identifies the most significant source of education or training category designated for each occupation. This table provides the user with a comprehensive picture of a specific occupation and makes it easier to compare the attributes of different occupations. The data used in preparing table 2 are available electronically for those desiring different tables or analyses of its contents.

Changes in industry employment, and the utilization of the occupation within an industry affect occupational employment. Chapter III presents information about the factors affecting each of these categories.

The concept of replacement needs often is confusing. Chapter IV defines what the data on replacement needs represent, and describes how they were prepared. Projected replacement rates and estimates of replacement needs for 1998-2008 also are presented.

Finally, data from the National Center for Education Statistics on completions of institutional education and training programs by field of study appear in chapter V.

In all cases, national data are provided. Data for States and local areas may be obtained from sources identified in the appendix.

Sean Kirby, Andrew Nelson, Kristina Shelley, Tiffany T. Stringer, Patricia Tate, and Mitra Toossi prepared this bulletin. Alan Eck, Manager, Occupational Outlook Studies, supervised preparation of the material under the direction of Mike Pilot, Chief, Division of Occupational Outlook. For further information about material contained in this bulletin, please call the Chief, Division of Occupational Outlook at (202) 691-5703.

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Information on the Internet

The Office of Employment Projections maintains the "Employment Projections Home Page" on the BLS Internet site (**http://stats.bls.gov/emphome.htm**). It provides access to an electronic copy of the *Occupational Outlook Handbook*, articles from the November 1999 *Monthly Labor Review* that describe the 1998-2008 projections in detail, frequently requested tables, and many other items of interest to users of industry and occupation employment projections. The "Employment Projections Home Page" also provides access to two online systems. The first permits searches of the employment data comprising the 1998-2008 national industry-occupation matrix; the second provides access to occupational employment, job openings, earnings, training, and other information from this publication.

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Chapter I. New Secondary Job Employment Data

Current and projected occupational employment data are valuable products of the BLS projections program. The information about expected employment change underlies descriptive material presented in the *Occupational Outlook Handbook*, and is widely used by education and training program planners, jobseekers, and others. Table 2 in chapter II contains 1998-2008 employment and other occupational data.

Employment estimates include data from several sources to provide information for all occupations in all industries. In addition, over time, sources change as new information becomes available. With the 1998-2008 projections, more comprehensive occupational employment estimates result from newly available secondary job data. This chapter reviews employment coverage and data sources, and discusses the new secondary job data.

Data coverage

The BLS projections cover employment of wage and salary workers, self-employed workers, and unpaid family workers. No single source provides all the data on employment that form the base-year estimates for the projections. Data on the employment of most wage and salary workers is derived by multiplying industry employment collected in the Current Employment Statistics (CES) survey by the occupational employment distribution of industries collected in the Occupational Employment Statistics (OES) survey. [1] Both the CES and the OES are payroll surveys. Therefore, the employment data represent jobs, not individuals, because individuals may hold jobs on more than one payroll. Occupational employment data for wage and salary workers in the Federal Government, which are not collected by the OES survey, are provided by the Office of Personnel Management, except for Postal Service workers, for whom data are provided directly by the Postal Service.

The OES survey also does not cover agricultural production, forestry, fishing, hunting, or private households. Data on wage and salary worker employment for these industries are obtained from the Current Population Survey (CPS). Occupational employment data on self-employed workers and unpaid family workers also are developed from CPS data. The CPS is a household survey, and the data traditionally published from this survey represent individuals.[2] Employment totals equal the number of individuals, and occupational and industry employment information from the CPS is based on the primary jobs of individuals. Thus, CPS data that generally are available exclude secondary wage and salary jobs of wage and salary workers in agricultural production, forestry, fishing, hunting, or private households, if the secondary job was also in one of these industries. (Secondary jobs held in other industries would be included in the payroll data discussed above.) The CPS data generally available also exclude secondary jobs as self-employed or unpaid family workers held by wage and salary workers. In 1998, however, new data became available from the CPS and the occupational employment database used to develop current estimates of employment for the employment projections program was expanded to include the coverage of secondary jobs for these workers.

An industry-occupation matrix serves as the framework for presenting current and projected employment estimates. Information on more than 500 detailed occupations is presented in rows of the matrix. The occupational structure follows that of the OES survey, which generally is consistent with the 1980 Standard Occupational Classification (SOC) system. Some occupations not included in the OES survey are included in the matrix—private household occupations, farmers, and several other agricultural, forestry, and fishing occupations.

Employment information for over 260 industries appears in columns of the matrix. Industry data are presented only for wage and salary worker employment, which accounts for 90 percent of total employment. Industries are defined using the 1987 Standard Industrial Classification (SIC) system. Employment information for self-employed and unpaid family workers in their primary and secondary jobs is presented in the remaining columns of the matrix.

Total occupational employment is the sum of wage and salary occupational employment for industries, and self-employed and unpaid family workers in their primary and secondary jobs.[3]

[1] See "Chapter 13. Employment Projections," *BLS Handbook of Methods*, Bulletin 2490 (Bureau of Labor Statistics, April 1997), pp.122-129.

[2] BLS uses Current Population Survey (CPS) data to develop statistics about the employment status of the population and related data. The unemployment rate, for example, identifies the proportion of individuals in the labor force without a job, but who were actively seeking employment. Similarly, occupation, industry, age, education, earnings, and other employment information derived from the CPS that appear in the monthly BLS publication *Employment and Earnings* and other places report the characteristics of individuals. *Employment and Earnings* contains information about the number of persons with multiple jobs, but only primary jobs are included in employment estimates.

[3] Only wage and salary employment, by occupation, is available for industries. For example, legal services industry (SIC 81) employment identifies only lawyers with wage and salary jobs. While the number of self-employed lawyers in all industries is presented, the number of self-

New CPS secondary job data

Monthly collection of secondary job data began in 1994 with implementation of the redesigned CPS.[4] Secondary job information previously was collected on an irregular basis in the CPS, as part of a "dual job holder supplement" to a single survey. Since 1994, respondents in about 25 percent of the CPS households surveyed monthly provide occupation and class of worker information about their secondary job. By definition, individuals who have a primary job as a self-employed or unpaid family worker cannot hold a self-employed or unpaid family worker secondary job. Because the CPS and OES surveys use different occupational classification systems, 1998 CPS annual average data on secondary job are applied to the most comparable OES survey-based occupation. Occupational information about the self-employed, secondary job; unpaid family workers, secondary job; and wage and salary workers, secondary job in agricultural production, farming, fishing, or private households are included as separate columns in the 1998-2008 employment matrix.

The 1998 annual average CPS data identify 2.1 million secondary jobs. Self-employed secondary jobs—1.9 million—contributed the vast majority. Wage and salary secondary jobs in agricultural production, forestry, fishing, and private households—163,000—and secondary jobs held as unpaid family workers—41,000—account for only about 10 percent of the new secondary jobs. Table 1 presents information for occupations with 5,000 or more secondary jobs; data for all occupations are available at the Internet site:
http://stats.bls.gov/asp/oep/nioem/empiohm.asp.

Several major occupational groups contain large numbers of self-employed secondary jobs. The greatest percentages of such jobs are found in agricultural, forestry, and fishing occupations (21 percent), almost all of them farmers. With 318,000 jobs, farmers were almost twice as numerous as the second largest occupation, and accounted for 17 percent of all self-employed secondary jobs. Marketing and sales (19 percent), professional specialty (18 percent), and executive, administrative, and managerial occupations (14 percent) also had large numbers of self-employed secondary jobs, but in a wide range of detailed occupations. Self-employed secondary jobs in entertainment or artistic occupations were prominent in the professional specialty group.[5]

The distributions for unpaid family worker and wage and salary worker secondary jobs in agricultural production, forestry, fishing, and private households are concentrated in a few detailed occupations. Among unpaid family workers, four occupations— farm workers; bookkeeping, accounting, and auditing clerks; farmers; and retail sales persons—constitute 54 percent of secondary jobs. The concentration is even greater for wage and salary worker secondary jobs in agricultural production, forestry, fishing, and private households. Four occupations—cleaners and servants, private household; child care workers, private household; farm workers; and farm managers—account for 66 percent of these secondary jobs.

employed lawyers in the legal services industry, or in any other industry, is not available.

[4] The September 1993 issue of the *Monthly Labor Review* is devoted to discussing changes implemented to the Current Population Survey in January 1994.

[5] For a detailed discussion of self-employed secondary jobs, see Jeffrey C. Gruenert, "Second job entrepreneurs," *Occupational Outlook Quarterly*, Fall 1999, pp. 18—26.

Table 1. Current Populationa Survey secondary jobs, class of worker, by occupation, 1998

(Occupations with 5,000 or more jobs. Numbers in thousands.)

1998 Matrix occupation	Total, secondary jobs		Self-employed workers, secondary job		Unpaid family workers, secondary job		Wage and salary workers, secondary job in agricultural production, forestry, fishing, or private households	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total, all occupations	2,060	100.0	1,855	100.0	41	100.0	163	100.0
Executive, administrative, and managerial occupations	293	14.2	289	15.6	4	10.1	0	.0
Construction managers	6	.3	4	.2	1	3.1	0	.0
Food service and lodging managers	19	.9	19	1.0	(1)	.5	0	.0
Property, real estate, and community association managers	48	2.3	47	2.5	1	2.8	0	.0
All other managers and administrators	117	5.7	116	6.3	(1)	.9	0	.0
Accountants and auditors	31	1.5	31	1.7	0	.0	0	.0
Management analysts	35	1.7	35	1.9	0	.0	0	.0
Tax preparers	9	.4	9	.5	0	.0	0	.0
All other management support workers	11	.6	11	.6	0	.0	0	.0
Professional specialty occupations	369	17.9	366	19.7	0	.0	4	2.2
Computer engineers	9	.4	9	.5	0	.0	0	.0
Systems analysts	19	.9	19	1.0	0	.0	0	.0
Psychologists	22	1.1	22	1.2	0	.0	0	.0
Lawyers	13	.6	13	.7	0	.0	0	.0
Instructors and coaches, sports and physical training	21	1.0	21	1.1	0	.0	(1)	.1
Instructors, adult (nonvocational) education	11	.5	11	.6	0	.0	(1)	.1
Teachers and instructors, vocational education and training	29	1.4	29	1.6	0	.0	(1)	.2
All other teachers and instructors	17	.8	17	.9	0	.0	(1)	.2
Physicians	5	.3	5	.3	0	.0	0	.0
Registered nurses	6	.3	4	.2	0	.0	2	1.4
Actors, directors, and producers	8	.4	8	.4	0	.0	0	.0
Announcers	6	.3	6	.3	0	.0	0	.0
Artists and commercial artists	23	1.1	23	1.3	0	.0	0	.0
Athletes, coaches, umpires, and related workers	11	.5	11	.6	0	.0	0	.0
Designers, except interior designers	28	1.3	28	1.5	0	.0	0	.0
Musicians, singers, and related workers	36	1.8	36	1.9	0	.0	0	.0
Photographers	24	1.2	24	1.3	0	.0	0	.0
Writers and editors, including technical writers	30	1.5	30	1.6	0	.0	0	.0
Technicians and related support occupations	19	.9	17	.9	1	1.8	1	.7
Drafters	5	.3	5	.3	0	.0	0	.0
Computer programmers	9	.4	9	.5	0	.0	0	.0
Marketing and sales occupations	388	18.9	383	20.7	5	12.3	0	.0
Marketing and sales worker supervisors	134	6.5	133	7.2	2	3.9	0	.0
Sales agents, real estate	19	.9	19	1.0	0	.0	0	.0
Retail salespersons	44	2.2	41	2.2	3	8.0	0	.0
Securities, commodities, and financial services sales agents	10	.5	10	.5	0	.0	0	.0
All other sales and related workers	163	7.9	163	8.8	(1)	.5	0	.0
Administrative support occupations, including clerical	91	4.4	80	4.3	8	19.4	3	2.0
Bookkeeping, accounting, and auditing clerks	43	2.1	36	1.9	5	11.2	2	1.4
Court reporters, medical transciptionists, and stenographers	8	.4	8	.4	0	.0	0	.0
Secretaries, except legal and medical	5	.2	5	.3	(1)	.3	0	.0
Word processors and typists	6	.3	6	.3	0	.0	0	.0
Data entry keyers	7	.4	6	.3	1	2.8	0	.0
All other clerical and administrative support workers	9	.4	9	.5	0	.0	0	.0
Service occupations	181	8.8	89	4.8	2	4.5	90	55.1
Janitors and cleaners, including maids and housekeeping cleaners	27	1.3	26	1.4	0	.0	1	.5
All other cleaning and building service workers	7	.3	7	.4	0	.0	(1)	.0
Nursing aides, orderlies, and attendants	7	.4	2	.1	0	.0	5	3.2
Child care workers	16	.8	16	.9	0	.0	0	.0
Hairdressers, hairstylists, and cosmetologists	11	.5	11	.6	0	.0	0	.0
Child care workers, private household	28	1.4	0	.0	0	.0	28	17.5
Cleaners and servants, private household	50	2.4	0	.0	0	.0	50	30.7
Private detectives and investigators	8	.4	8	.4	0	.0	0	.0
All other service workers	7	.3	7	.4	0	.0	(1)	.1
Agriculture, forestry, fishing, and related occupations	458	22.2	386	20.8	15	36.4	56	34.6
Farmers	323	15.7	319	17.2	4	10.8	0	.0
Farm managers	14	.7	1	.0	0	.0	14	8.3
Farm workers	41	2.0	4	.2	10	23.8	28	17.2

[1] Less than 500

NOTE: Percent distributions are calculated on unrounded numbers.

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Table 1. Current Populations Survey secondary jobs, class of worker, by occupation, 1998 — Continued

(Occupations with 5,000 or more jobs. Numbers in thousands.)

1998 Matrix occupation	Total, secondary jobs		Self-employed workers, secondary job		Unpaid family workers, secondary job		Wage and salary workers, secondary job in agricultural production, forestry, fishing, or private households	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Laborers, landscaping and groundskeeping	41	2.0	39	2.1	0	.0	2	1.2
Lawn service managers	7	.4	7	.4	0	.0	0	.0
All other agricultural, forestry, fishing, and related workers	11	.5	2	.1	1	1.8	9	5.5
Precision production, craft, and repair occupations	172	8.3	170	9.1	1	1.7	2	.9
Blue-collar worker supervisors	16	.8	16	.9	0	.0	0	.0
Carpenters	19	.9	19	1.0	0	.0	0	.0
Electricians	16	.8	16	.9	0	.0	0	.0
Painters and paperhangers	10	.5	10	.5	0	.0	0	.0
Plumbers, pipefitters, and steamfitters	6	.3	6	.3	0	.0	0	.0
Data processing equipment repairers	7	.3	7	.4	0	.0	0	.0
Maintenance repairers, general utility	8	.4	8	.4	0	.0	0	.0
Automotive mechanics and service technicians	17	.8	17	.9	0	.0	0	.0
Heating, air conditioning, and refrigeration mechanics and installers	6	.3	6	.3	0	.0	0	.0
Operators, fabricators, and laborers	89	4.3	76	4.1	6	10.8	7	4.5
All other assemblers, fabricators, and hand workers	21	1.0	21	1.2	0	.0	0	.0
Driver/sales workers	8	.4	8	.4	0	.0	0	.0
Truck drivers light and heavy	16	.8	14	.8	([1])	.8	1	.8
Cleaners of vehicles and equipment	7	.4	6	.3	1	2.5	0	.0
All other helpers, laborers, and material movers, hand	10	.5	4	.2	2	4.2	5	2.8

[1] Less than 500

NOTE: Percent distributions are calculated on unrounded numbers.

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Chapter II. Selected Occupational Data, 1998 and Projected 2008

Every other year, BLS updates data on current and projected employment, employment change, self-employment, annual average job openings, and other characteristics for all national industry-occupation matrix occupations to ensure that the information is current. These data are distributed in a variety of formats and publications, ranging from the detailed discussion and tables in the *Monthly Labor Review* (November 1999) to the brief text and graphic presentations in the *Occupational Outlook Quarterly (winter edition, 1999-2000).* In addition, the searchable Industry-Occupation Matrix and Occupational Employment, Training, and Earnings Internet sites display the data. The data also underlie the job outlook information published in the *Occupational Outlook Handbook.*

Many presentations are designed to help users by examining single or multiple characteristics across occupations and highlighting the results. The results are presented in table or chart format. For example, a table or chart may identify the fastest growing occupations or occupations with the most new jobs.

Table 2 displays data on 1998 and projected 2008 employment, employment change, self-employment, annual average job openings, and other characteristics for all national industry-occupation matrix occupations. Also presented are quartile rankings designating the relative magnitude of data for each detailed occupation. As a result, readers using table 2 can obtain specific data about several variables for any occupation and can use the rankings to determine how information for a specific occupation compares with that for other occupations.

Data presented

Information about each variable's data source and po ential use is presented below. As discussed earlier, the OES survey and the CPS provide almost all the employment data used in developing the 1998-2008 projections: These surveys also are the source of the other statistical information contained in table 2.

Occupational data from the OES survey are not entirely comparable with those from the CPS because of differences in occupationa! classification systems, and differences in concepts and methods used in the two surveys. Information about worker characteristics that is based on CPS data is applied to industry-occupation matrix occupations based on judgments identifying the most comparable CPS occupations. Comparisons based on CPS occupations with fewer than 50,000 workers in 1998 and some other occupations for which the data appeared unreliable were excluded; data for CPS proxy occupations were substituted. Where possible, larger, closely related CPS occupations were chosen as proxies. For example, data for purchasing agents and buyers, not elsewhere classified, were used to represent purchasing agents and buyers of farm products. When a detailed occupation could not be identified, a summary occupational group was used. For example, data about all therapists were substituted for those about inhalation therapists.

Rankings for data categories identify the relative magnitude of variables in terms of the distribution of employment. For example, to rank the projected percent change in employment, 1998 employment and projected 1998-2008 percent change in employment data were assembled for each occupation. Each occupation's employment as a percent of 1998 total employment was calculated. The occupations were sorted by employment change in descending order and the cumulative percent of 1998 employment for each was determined. Occupations within the group accounting for less than 25 percent of total employment are designated "VH" for a very high growth rate. Similarly, occupations sorted by descending order of employment change accounting for 25 to 50 percent of employment are "H" (high); 50 to 75 percent, "L" (low); and 75 to 100 percent, "VL" (very low). Occupations were sorted by other data elements, and rankings were determined in the same manner.

Employment, 1998 and 2008. (Source: Bureau of Labor Statistics, national industry-occupation matrixes for 1998 and 2008.) Employment information is a useful starting point for assessing opportunities because large occupations usually have more openings than small ones, regardless of growth or replacement rates. The data include jobs in all industries.

Employment change, 1998-2008, numeric. (Source: Bureau of Labor Statistics, national industry-occupation matrixes for 1998 and 2008.) Information on numerical change provides an absolute measure of projected job gains or losses.

Employment change, 1998-2008, percent. (Source: Bureau of Labor Statistics, national industry-occupation matrixes for 1998 and 2008.) The percent change in employment measures the rate of change. A rapidly growing oc-

cupation usually indicates favorable prospects for employment. Moreover, the high demand for workers in a rapidly growing occupation improves their chances for advancement and mobility. A modest employment growth in a large occupation can result in many more job openings than rapidly growing employment growth in a small occupation.

Percent self-employed, 1998. (Source: Bureau of Labor Statistics, national industry-occupation matrixes for 1998 and 2008.) Individuals who are interested in creating and managing their own business may find it important to know the percentage of self-employed workers. This percentage is calculated from CPS data about unincorporated self-employed persons in their primary or secondary job who are included in industry-occupation matrix employment data. The unincorporated self-employed work for earnings or fees in their own business and, unlike self-employed persons in businesses that are incorporated, do not receive a wage or salary.

Job openings due to growth plus total replacement needs, 1998-2008. (Source: Bureau of Labor Statistics, this publication.) These data provide the broadest measure of opportunities and identify the total number of additional employees needed annually in an occupation. Growth is calculated using data on increases in occupational employment from national industry-occupation matrixes for 1998-2008. These replacements refer to all job openings, regardless of experience level, and reflect the normal movements in the labor force. If employment declines, job openings due to growth are zero. Total replacement needs are calculated from 1995-96 CPS data, and are described in chapter IV. Data from CPS proxy occupations are used to estimate replacement needs for some matrix occupations.

Job openings due to growth plus net replacement needs, 1998-2008. (Source: Bureau of Labor Statistics, this publication.) These data estimate the number of new workers needed annually in an occupation and, if training is required, measure minimum training needs. Growth is calculated using data on increases in occupational employment from national industry-occupation matrixes for 1998-2008. If employment declines, job openings due to growth are zero. These net replacement job openings typically are due to experienced workers leaving the occupation or the labor force. Net replacement needs are calculated from CPS data and are described in chapter IV. Data from CPS proxy occupations estimate replacement needs for some matrix occupations.

Median annual earnings, 1998. (Source: 1998 Occupational Employment Statistics (OES) survey, with some exceptions. OES data are not available for government chief executives and legislators. OES data also are not available for private household workers; farm operators and managers; captains and other officers, fishing vessels. Estimates developed from 1998 Current Population Survey annual average data for wage and salary employees provide information for child care workers, private household; and cleaners and servants, private household..) Table 2 uses median annual earnings of workers to compare earnings among different occupations.

Unemployment rate. (Source: Average of 1996-98 Current Population Survey data.) Some occupations are more susceptible to factors that result in unemployment: Seasonality, fluctuations in economic conditions, and individual business failures. A high unemployment rate indicates that individuals in that occupation are more likely to become unemployed than are those in occupations with a low rate. Data from CPS proxy occupations are used to estimate unemployment rates for some matrix occupations.

Percent part-time. (Source: Average of 1996-98 Current Population Survey data.) Persons who prefer part-time work may want to know the proportion of employees who work fewer than 35 hours per week. Data from CPS proxy occupations are used to estimate the proportion of part-time workers for some matrix occupations.

Most significant source of education or training. (Source: Bureau of Labor Statistics.) Occupations are classified into 1 of 11 categories that describe the education or training needed by most workers to become fully qualified. The categories are: first professional degree, doctoral degree, master's degree, work experience in an occupation requiring a bachelor's or higher degree, bachelor's degree, associate degree, postsecondary vocational training, work experience in a related occupation, long-term on-the-job training, moderate-term on-the-job training, and short-term on-the-job training. The following are definitions of these categories.

Occupations that require a first professional degree. The first professional degree is the minimum preparation required for entry into several professions, including law, medicine, dentistry, and the clergy. Completion of this academic program usually requires at least 2 years of full-time academic study beyond a bachelor's degree.

Occupations that generally require a doctoral degree. The doctoral degree also can be easily related to specific occupations. It normally requires at least 3 years of full-time academic work beyond the bachelor's degree.

Occupations that generally require a master's degree. Completion of a master's degree program usually requires 1 or 2 years of full-time study beyond the bachelor's degree.

Occupations that generally require work experience in an occupation requiring a bachelor's or higher degree. Most occupations in this category are managerial occupations that require experience in a related non

managerial occupation. Jobs in these occupations usually are filled with experienced staff who are promoted into a managerial position, such as engineers who advance to engineering manager. It is very difficult to become a judge without first working as a lawyer, or to become a personnel, training, or labor relations manager without first gaining experience as a specialist in one of these fields.

Occupations that generally require a bachelor's degree. This is a degree program requiring at least 4 but not more than 5 years of full-time academic work after high school. The bachelor's degree is considered the minimum requirement for most professional occupations, such as mechanical engineer, pharmacist, recreational therapist, and landscape architect.

Occupations that generally require an associate degree. Completion of this degree program usually requires at least 2 years of full-time academic work after high school. Most occupations in this category are health related, such as registered nurse, respiratory therapist, and radiologic technologist. Also included are science and mathematics technicians and paralegals.

Occupations that generally require completion of vocational training provided in postsecondary vocational schools. Workers normally qualify for jobs by completing vocational training programs or by taking job-related college courses that do not result in a degree. Some programs take less than a year to complete and lead to a certificate or diploma. Others last longer than a year, but less than 4 years. Occupations in this category include some that require only the completion of a training program (such as a travel agent) and those that require individuals to pass a licensing exam after completion of the program before they can work (such as barber and cosmetologist).

Occupations that generally require skills developed through work experience in a related occupation. Jobs in this category require skills and experience gained in another occupation; the category also includes occupations in which skills may be developed from hobbies or other activities besides current or past employment or from service in the Armed Forces. Among the occupations are cost estimators, who generally need prior work experience in one of the construction trades; police detectives, who are selected based on their experience as police patrol officers; and lawn service managers, who may be hired based on their experience as groundskeepers.

Long-term on-the-job training. This category includes occupations that usually require more than 12 months of on-the-job training or combined work experience and formal classroom instruction before workers develop the skills needed for average job performance. Among these are such occupations as electrician, bricklayer, and machinist that normally require formal or informal apprenticeships lasting up to 4 years. Long-term on-the-job training also includes intensive occupation-specific, employer-sponsored programs that workers must successfully complete before they can begin work. These include fire and police academies and schools for air traffic controllers and flight attendants. In other occupations—insurance sales and securities sales, for example—trainees take formal courses, often provided at the job site, to prepare for the required licensing exams. Individuals undergoing training usually are considered employed in the occupation. This group of occupations also includes musicians, athletes, actors, and other entertainers—occupations that require natural ability that must be developed over several years.

Moderate-term on-the-job training. Workers can achieve average job performance after 1 to 12 months of combined job experience and informal training, which can include observing experienced workers. Individuals undergoing training normally are considered employed in the occupation. This type of training is found among occupations such as dental assistants, drywall installers and finishers, operating engineers, and machine operators. The training involves trainees watching experienced workers and asking questions. Trainees are given progressively more difficult assignments as they demonstrate their mastery of lower level skills.

Short-term on-the-job training. Included are occupations like cashier, bank teller, messenger, highway maintenance worker, and veterinary assistant. In these occupations, workers usually can achieve average job performance in just a few days or weeks by working with and observing experienced employees and by asking questions.

Using ranked information

Table 2 consolidates 1998 and 2008 projected employment data, and also provides comparisons of occupational data. It ranks information about current and projected employment, projected job openings, earnings, unemployment rates, and the proportion of part-time workers. Except for the unemployment and part-time categories, a high rating indicates a favorable assessment. A high rating for the unemployment rate is considered undesirable. Unemployment rates in construction occupations, however, are inflated by the nature of the industry and distort comparisons. Construction workers typically incur periods of unemployment after completing a project and before starting work on a new project. (Text continues on page 34.)

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Total, all occupations	140,514	160,795	20,281	-	14.4	-	8.7	28,351	-
Executive, administrative, and managerial occupations	14,770	17,196	2,426	-	16.4	-	14.3	2,090	-
Managerial and administrative occupations	10,139	11,823	1,684	-	16.6	-	16.2	1,402	-
Administrative services managers	364	430	66	L	18.1	H	.0	47	L
Advertising, marketing, promotions, public relations, and sales managers	485	597	112	L	23.0	VH	2.5	89	L
Communication, transportation, and utilities operations managers	196	234	38	L	19.3	VH	.0	25	VL
Construction managers	270	308	38	L	14.0	L	16.6	33	VL
Education administrators	447	505	58	L	13.0	L	8.7	60	L
Engineering, natural science, and computer and information systems managers	326	468	142	H	43.5	VH	.0	54	L
Financial managers	693	791	97	L	14.0	L	.8	78	L
Food service and lodging managers[1]	595	691	97	L	16.3	H	35.0	139	L
Funeral directors and morticians[1]	28	32	4	VL	16.1	H	8.8	4	VL
General managers and top executives	3,362	3,913	551	VH	16.4	H	.0	421	VH
Government chief executives and legislators[1]	80	82	2	VL	2.8	VL	.0	6	VL
Human resources managers	230	274	45	L	19.4	VH	.5	33	VL
Industrial production managers	208	207	-2	VL	-.9	VL	.0	21	VL
Medical and health services managers	222	297	74	L	33.3	VH	6.3	31	VL
Postmasters and mail superintendents[1]	26	27	1	VL	3.0	VL	.0	3	VL
Property, real estate, and community association managers[1]	315	359	43	L	13.7	L	47.6	48	L
Purchasing managers	176	188	13	VL	7.1	VL	.1	25	VL
All other managers and administrators[1]	2,114	2,420	305	VH	14.4	H	54.9	284	H
Management support occupations	4,631	5,374	743	-	16.0	-	10.3	688	-
Accountants and auditors	1,080	1,202	122	L	11.3	L	13.2	130	L
Assessors and real estate appraisers	70	78	8	-	11.3	-	18.1	9	-
Assessors	22	25	3	VL	11.8	L	.0	2	VL
Real estate appraisers	48	53	5	VL	11.2	L	26.6	6	VL
Budget analysts	59	67	8	VL	13.7	L	.0	10	VL
Buyers and purchasing agents	371	396	25	-	6.7	-	6.4	79	-
Purchasing agents and buyers, farm[1]	29	30	1	VL	5.0	VL	13.0	5	VL
Purchasing agents, except wholesale, retail, and farm products	224	248	24	L	10.8	L	1.2	42	VL
Wholesale and retail buyers, except farm products	118	118	0	VL	-.4	VL	14.6	31	VL
Construction and building inspectors	68	79	11	VL	15.7	H	6.0	4	VL
Cost estimators	152	171	20	VL	13.0	L	.0	26	VL
Credit analysts	42	50	8	VL	19.9	VH	.0	7	VL
Employment interviewers, private or public employment service	66	74	8	VL	12.9	L	.0	14	VL
Human resources, training, and labor relations specialists	367	433	66	L	17.9	H	3.9	83	L
Inspectors and compliance officers, except construction	176	195	19	VL	10.5	L	3.0	20	VL
Insurance claims adjusters, appraisers, examiners, and investigators	239	284	45	-	18.0	-	4.7	21	-
Insurance claims adjusters, examiners, and investigators	229	272	43	-	18.7	-	4.9	20	-
Claims examiners, property and casualty insurance	49	55	6	VL	12.5	L	.0	4	VL
Insurance adjusters, examiners, and investigators	180	217	37	L	20.4	VH	6.2	16	VL
Insurance appraisers, auto damage	10	12	2	VL	16.0	H	.0	1	VL
Insurance underwriters	97	100	3	VL	2.7	VL	1.1	4	VL
Loan counselors and officers	227	276	48	L	21.2	VH	.0	40	VL
Management analysts[1]	344	442	98	L	28.4	VH	53.5	24	VL
Tax examiners, collectors, and revenue agents	62	66	3	VL	5.4	VL	.0	5	VL
Tax preparers	79	95	15	VL	19.3	VH	33.1	14	VL
All other management support workers[1]	1,130	1,366	236	H	20.9	VH	4.4	199	H

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characterisitcs, 1998

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
5,462	-	-	-	-	-	-	**Total, all occupations**
511	-	-	-	-	-	-	**Executive, administrative, and managerial occupations**
348	-	-	-	-	-	-	Managerial and administrative occupations
13	L	44,370	VH	VL	L	Work experience plus degree[3]	Administrative services managers
18	L	57,300	VH	L	VL	Work experience plus degree[3]	Advertising, marketing, promotions, public relations, and sales managers
7	VL	52,810	VH	VL	L	Work experience plus degree[3]	Communication, transportation, and utilities operations managers
9	VL	47,610	VH	VL	L	Bachelor's degree	Construction managers
17	L	60,400	VH	VL	H	Work experience plus degree[3]	Education administrators
20	L	75,330	VH	VL	L	Work experience plus degree[3]	Engineering, natural science, and computer and information systems managers
21	L	55,070	VH	VL	VL	Work experience plus degree[3]	Financial managers
20	L	26,700	H	L	H	Related work experience	Food service and lodging managers[1]
1	VL	35,040	VH	VL	L	Associate degree	Funeral directors and morticians[1]
114	VH	55,890	VH	VL	L	Work experience plus degree[3]	General managers and top executives
2	VL	n.a.	-	VL	L	Work experience plus degree[3]	Government chief executives and legislators[1]
10	VL	49,010	VH	L	VL	Work experience plus degree[3]	Human resources managers
4	VL	56,320	VH	VL	L	Bachelor's degree	Industrial production managers
11	L	48,870	VH	L	H	Work experience plus degree[3]	Medical and health services managers
1	VL	44,730	VH	VL	L	Related work experience	Postmasters and mail superintendents[1]
9	VL	29,930	H	L	H	Bachelor's degree	Property, real estate, and community association managers[1]
5	VL	41,830	VH	VL	VL	Work experience plus degree[3]	Purchasing managers
68	H	49,300	VH	VL	L	Work experience plus degree[3]	All other managers and administrators[1]
162	-	-	-	-	-	-	Management support occupations
29	L	37,860	VH	VL	L	Bachelor's degree	Accountants and auditors
2	-	-	-	-	-	-	Assessors and real estate appraisers
1	VL	29,830	H	VL	L	Bachelor's degree	Assessors
2	VL	40,290	VH	VL	H	Bachelor's degree	Real estate appraisers
2	VL	44,950	VH	VL	L	Bachelor's degree	Budget analysts
12	-	-	-	-	-	-	Buyers and purchasing agents
1	VL	32,070	H	L	L	Bachelor's degree	Purchasing agents and buyers, farm[1]
8	VL	38,040	VH	L	L	Bachelor's degree	Purchasing agents, except wholesale, retail, and farm products
3	VL	31,560	H	L	H	Bachelor's degree	Wholesale and retail buyers, except farm products
3	VL	37,540	VH	L	L	Related work experience	Construction and building inspectors
4	VL	40,590	VH	L	H	Bachelor's degree	Cost estimators
2	VL	35,590	VH	VL	L	Bachelor's degree	Credit analysts
3	VL	29,800	H	L	L	Bachelor's degree	Employment interviewers, private or public employment service
16	L	37,710	VH	L	L	Bachelor's degree	Human resources, training, and labor relations specialists
5	VL	36,820	VH	VL	VL	Related work experience	Inspectors and compliance officers, except construction
8	-	-	-	-	-	-	Insurance claims adjusters, appraisers, examiners, and investigators
8	-	-	-	-	-	-	Insurance claims adjusters, examiners, and investigators
1	VL	40,110	VH	VL	L	Bachelor's degree	Claims examiners, property and casualty insurance
7	VL	38,290	VH	VL	L	Long-term on-the-job	Insurance adjusters, examiners, and investigators
0	VL	40,000	VH	VL	L	Long-term on-the-job	Insurance appraisers, auto damage
3	VL	38,710	VH	L	H	Bachelor's degree	Insurance underwriters
10	VL	35,340	VH	VL	L	Bachelor's degree	Loan counselors and officers
12	L	49,470	VH	L	H	Work experience plus degree[3]	Management analysts[1]
2	VL	39,540	VH	VL	VL	Bachelor's degree	Tax examiners, collectors, and revenue agents
3	VL	27,960	H	VL	L	Moderate-term on-the-job	Tax preparers
46	H	37,860	VH	VL	L	Bachelor's degree	All other management support workers[1]

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characterisitcs, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Professional specialty occupations	19,802	25,145	5,343	-	26.9	-	9.9	2,799	-
Engineers	1,462	1,752	290	-	19.8	-	3.4	133	-
Aerospace engineers	53	58	5	VL	8.8	L	.8	2	VL
Chemical engineers[1]	48	53	5	VL	9.5	L	2.3	4	VL
Civil engineers	195	236	41	L	20.9	VH	6.1	21	VL
Electrical and electronics engineers	357	450	93	L	25.9	VH	4.4	30	VL
Industrial engineers, except safety engineers	126	142	16	VL	12.8	L	2.6	13	VL
Materials engineers	20	21	2	VL	9.0	L	3.7	2	VL
Mechanical engineers	220	256	36	L	16.4	H	2.0	9	VL
Mining engineers, including mine safety engineers[1]	4	4	-1	VL	-12.6	VL	.0	0	VL
Nuclear engineers[1]	12	12	1	VL	5.8	VL	.0	1	VL
Petroleum engineers[1]	12	12	0	VL	-3.6	VL	15.0	1	VL
All other engineers[1]	415	509	94	L	22.6	VH	2.6	51	L
Architects and surveyors	163	185	23	-	13.8	-	25.1	17	-
Architects, except landscape and naval	99	118	19	VL	18.9	H	29.9	8	VL
Landscape architects	22	25	3	VL	14.5	H	40.7	2	VL
Surveyors, cartographers, and photogrammetrists[1]	41	42	1	VL	1.4	VL	5.4	7	VL
Life scientists	173	219	45	-	26.2	-	4.4	19	-
Agricultural and food scientists[1]	21	24	2	VL	10.9	L	17.4	2	VL
Biological scientists	81	109	28	L	35.0	VH	.9	10	VL
Conservation scientists and foresters[1]	39	46	7	VL	17.9	H	5.5	3	VL
Medical scientists	31	39	8	VL	24.6	VH	3.4	3	VL
All other life scientists	1	1	0	VL	16.5	H	.0	0	VL
Computer, mathematical, and operations research occupations	1,653	3,182	1,529	-	92.4	-	7.1	404	-
Actuaries[1]	16	17	1	VL	7.1	VL	14.2	2	VL
Computer systems analysts, engineers, and scientists	1,530	3,052	1,522	-	99.4	-	7.4	395	-
Computer engineers and scientists	914	1,858	944	-	103.3	-	4.7	241	-
Computer engineers	299	622	323	VH	107.9	VH	10.8	81	L
Computer support specialists	429	869	439	VH	102.3	VH	.0	113	L
Database administrators	87	155	67	L	77.2	VH	.0	19	VL
All other computer scientists	97	212	115	L	117.5	VH	11.0	28	VL
Systems analysts	617	1,194	577	VH	93.6	VH	11.5	154	L
Statisticians[1]	17	17	0	VL	2.3	VL	5.4	2	VL
Mathematicians and all other mathematical scientists[1]	14	13	-1	VL	-5.5	VL	.0	1	VL
Operations research analysts	76	83	7	VL	8.7	L	.7	5	VL
Physical scientists	200	229	29	-	14.6	-	4.0	17	-
Atmospheric scientists[1]	8	10	1	VL	14.6	H	.0	1	VL
Chemists	96	110	13	VL	13.9	L	1.6	8	VL
Geologists, geophysicists, and oceanographers[1]	44	51	7	VL	15.5	H	13.3	4	VL
Physicists and astronomers[1]	18	18	0	VL	2.2	VL	1.6	1	VL
All other physical scientists[1]	33	41	8	VL	22.7	VH	1.0	3	VL
Religious workers	304	356	53	-	17.2	-	1.2	32	-
Clergy	149	169	20	VL	13.4	L	.0	14	VL
Directors, religious activities and education[1]	112	140	28	L	25.1	VH	.0	13	VL
All other religious workers[1]	43	48	5	VL	10.7	L	8.7	4	VL
Social scientists	321	365	44	-	13.7	-	33.1	45	-
Economists and marketing research analysts	70	83	13	VL	18.4	H	25.7	12	VL
Psychologists	166	185	19	VL	11.4	L	49.8	21	VL
Urban and regional planners[1]	35	41	6	VL	17.4	H	.0	5	VL
All other social scientists[1]	50	56	6	VL	12.7	L	10.9	7	VL
Social and recreation workers	1,303	1,797	494	-	37.8	-	1.3	265	-
Recreation workers	241	287	46	L	19.2	H	.3	44	L
Residential counselors	190	278	88	L	46.3	VH	.0	28	VL
Social and human service assistants	268	410	141	H	52.7	VH	.0	92	L
Social workers	604	822	218	H	36.1	VH	2.6	103	L
Lawyers and judicial workers	752	871	119	-	15.8	-	32.4	41	-

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
915	-	-	-	-	-	-	**Professional specialty occupations**
61	-	-	-	-	-	-	Engineers
1	VL	66,950	VH	VL	VL	Bachelor's degree	Aerospace engineers
2	VL	64,780	VH	VL	VL	Bachelor's degree	Chemical engineers[1]
8	VL	53,450	VH	VL	VL	Bachelor's degree	Civil engineers
17	L	62,260	VH	VL	VL	Bachelor's degree	Electrical and electronics engineers
3	VL	52,610	VH	VL	VL	Bachelor's degree	Industrial engineers, except safety engineers
1	VL	57,970	VH	VL	VL	Bachelor's degree	Materials engineers
8	VL	53,290	VH	VL	VL	Bachelor's degree	Mechanical engineers
0	VL	56,090	VH	VL	VL	Bachelor's degree	Mining engineers, including mine safety engineers[1]
0	VL	71,310	VH	VL	VL	Bachelor's degree	Nuclear engineers[1]
0	VL	74,260	VH	VL	VL	Bachelor's degree	Petroleum engineers[1]
21	L	61,060	VH	VL	VL	Bachelor's degree	All other engineers[1]
5	-	-	-	-	-	-	Architects and surveyors
3	VL	47,710	VH	VL	L	Bachelor's degree	Architects, except landscape and naval
1	VL	37,930	VH	VL	L	Bachelor's degree	Landscape architects
1	VL	37,640	VH	L	L	Bachelor's degree	Surveyors, cartographers, and photogrammetrists[1]
9	-	-	-	-	-	-	Life scientists
1	VL	42,340	VH	VL	L	Bachelor's degree	Agricultural and food scientists[1]
5	VL	46,140	VH	VL	L	Doctoral degree	Biological scientists
2	VL	42,750	VH	VL	L	Bachelor's degree	Conservation scientists and foresters[1]
2	VL	50,410	VH	VL	L	Doctoral degree	Medical scientists
0	VL	41,320	VH	VL	L	Doctoral degree	All other life scientists
166	-	-	-	-	-	-	Computer, mathematical, and operations research occupations
0	VL	65,560	VH	VL	L	Bachelor's degree	Actuaries[1]
163	-	-	-	-	-	-	Computer systems analysts, engineers, and scientists
101	-	-	-	-	-	-	Computer engineers and scientists
34	H	61,910	VH	VL	L	Bachelor's degree	Computer engineers
47	H	37,120	VH	VL	L	Associate degree	Computer support specialists
8	VL	47,980	VH	VL	L	Bachelor's degree	Database administrators
12	L	46,670	VH	VL	L	Bachelor's degree	All other computer scientists
62	H	52,180	VH	VL	L	Bachelor's degree	Systems analysts
0	VL	48,540	VH	VL	L	Master's degree	Statisticians[1]
0	VL	49,120	VH	VL	L	Master's degree	Mathematicians and all other mathematical scientists[1]
3	VL	49,070	VH	VL	VL	Master's degree	Operations research analysts
8	-	-	-	-	-	-	Physical scientists
0	VL	54,430	VH	VL	L	Bachelor's degree	Atmospheric scientists[1]
3	VL	46,220	VH	VL	L	Bachelor's degree	Chemists
2	VL	53,890	VH	VL	L	Bachelor's degree	Geologists, geophysicists, and oceanographers[1]
1	VL	73,240	VH	VL	L	Doctoral degree	Physicists and astronomers[1]
2	VL	48,990	VH	VL	L	Bachelor's degree	All other physical scientists[1]
11	-	-	-	-	-	-	Religious workers
5	VL	28,890	H	VL	H	First professional degree	Clergy
5	VL	25,040	H	L	H	Bachelor's degree	Directors, religious activities and education[1]
1	VL	18,440	L	L	H	Bachelor's degree	All other religious workers[1]
11	-	-	-	-	-	-	Social scientists
3	VL	48,330	VH	VL	H	Bachelor's degree	Economists and marketing research analysts
5	VL	48,050	VH	VL	VH	Master's degree	Psychologists
1	VL	42,860	VH	VL	H	Master's degree	Urban and regional planners[1]
2	VL	38,990	VH	VL	H	Master's degree	All other social scientists[1]
75	-	-	-	-	-	-	Social and recreation workers
11	L	16,500	VL	L	H	Bachelor's degree	Recreation workers
13	L	18,840	L	VL	H	Bachelor's degree	Residential counselors
21	L	21,360	L	L	VH	Moderate-term on-the-job	Social and human service assistants
30	L	30,590	H	L	H	Bachelor's degree	Social workers
20	-	-	-	-	-	-	Lawyers and judicial workers

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characterisitcs, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Judges, magistrates, and other judicial workers[1]	71	73	2	VL	2.9	VL	.0	3	VL
Lawyers	681	798	117	L	17.2	H	35.8	38	VL
Teachers, librarians, and counselors	6,939	8,248	1,309	-	18.8	-	3.5	1,043	-
Teachers, preschool and kindergarten	529	645	116	-	21.9	-	1.0	61	-
Teachers, preschool	346	437	92	L	26.5	VH	1.5	42	VL
Teachers, kindergarten	184	208	25	L	13.4	L	.0	19	VL
Teachers, elementary school	1,754	1,959	205	H	11.7	L	.0	204	H
Teachers, secondary school	1,426	1,749	322	VH	22.6	VH	.0	134	L
Teachers, special education	406	543	137	H	33.8	VH	.0	37	VL
College and university faculty[1]	865	1,061	195	H	22.6	VH	.0	139	L
Other teachers and instructors	956	1,139	183	-	19.1	-	19.1	259	-
Farm and home management advisors	10	10	0	VL	-2.2	VL	.0	2	VL
Instructors and coaches, sports and physical training	359	460	102	L	28.4	VH	16.5	104	L
Adult and vocational education teachers	588	669	81	-	13.0	-	21.1	153	-
Instructors, adult (nonvocational) education	168	203	35	L	20.9	VH	20.5	46	L
Teachers and instructors, vocational education and training	420	466	46	L	11.0	L	21.3	106	L
All other teachers and instructors[1]	644	739	95	L	14.7	H	8.3	155	L
Librarians, archivists, curators, and related workers	175	186	10	-	5.8	-	.4	29	-
Archivists, curators, museum technicians, and conservators[1]	23	26	3	VL	12.6	L	3.1	4	VL
Librarians	152	159	7	VL	4.8	VL	.0	25	VL
Counselors	182	228	46	L	25.0	VH	.9	21	VL
Health diagnosing occupations	892	1,049	157	-	17.6	-	27.5	42	-
Chiropractors[1]	46	57	11	VL	22.8	VH	64.3	3	VL
Dentists	160	165	5	VL	3.1	VL	48.5	2	VL
Optometrists[1]	38	42	4	VL	10.6	L	33.6	2	VL
Physicians	577	699	122	L	21.2	VH	17.6	33	VL
Podiatrists[1]	14	15	1	VL	10.5	L	47.2	1	VL
Veterinarians[1]	57	71	14	VL	24.7	VH	29.9	3	VL
Health assessment and treating occupations	2,860	3,531	671	-	23.4	-	2.5	258	-
Dietitians and nutritionists	54	64	10	VL	19.1	H	10.4	8	VL
Pharmacists	185	199	14	VL	7.3	VL	3.9	6	VL
Physician assistants[1]	66	98	32	L	48.0	VH	.0	6	VL
Registered nurses	2,079	2,530	451	VH	21.7	VH	1.0	195	H
Therapists	476	640	164	-	34.5	-	8.1	42	-
Occupational therapists[1]	73	98	25	L	34.2	VH	10.6	6	VL
Physical therapists[1]	120	161	41	L	34.0	VH	5.3	11	VL
Radiation therapists[1]	12	14	2	VL	16.7	H	.0	1	VL
Recreational therapists[1]	39	44	5	VL	13.4	L	31.3	2	VL
Respiratory therapists[1]	86	123	37	L	42.6	VH	.9	9	VL
Speech-language pathologists and audiologists[1]	105	145	40	L	38.5	VH	10.3	10	VL
All other therapists[1]	40	54	14	VL	35.7	VH	2.3	4	VL
Writers, artists, and entertainers	1,996	2,409	413	-	20.0	-	39.6	352	-
Actors, directors, and producers[1]	160	198	38	L	23.8	VH	28.4	31	VL
Announcers	60	58	-3	VL	-4.3	VL	19.9	13	VL
Artists and commercial artists	308	388	79	L	25.7	VH	57.5	59	L
Athletes, coaches, umpires, and related workers	52	66	14	VL	27.9	VH	30.0	19	VL
Dancers and choreographers[1]	29	33	4	VL	13.6	L	30.8	5	VL
Designers	423	532	110	-	25.9	-	40.6	72	-
Designers, except interior designers	335	426	91	L	27.1	VH	44.0	58	L
Interior designers	53	68	15	VL	27.2	VH	44.9	9	VL
Merchandise displayers and window dressers	34	38	4	VL	12.7	L	.0	5	VL
Musicians, singers, and related workers	273	314	41	L	14.8	H	43.6	45	L
News analysts, reporters, and correspondents	67	68	2	VL	2.8	VL	7.1	8	VL
Photographers and camera operators	161	176	15	-	9.2	-	54.6	22	-
Camera operators, television, motion picture, video	11	15	3	VL	29.0	VH	8.1	2	VL
Photographers	149	161	12	VL	7.7	VL	58.1	20	VL

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
1	VL	35,630	VH	VL	L	Work experience plus degree[3]	Judges, magistrates, and other judicial workers[1]
19	L	78,170	VH	VL	L	First professional degree	Lawyers
283	-	-	-	-	-	-	
23	-	-	-	-	-	-	Teachers, librarians, and counselors
17	L	17,310	L	L	VH	Bachelor's degree	Teachers, preschool and kindergarten
6	VL	33,590	H	L	VH	Bachelor's degree	Teachers, preschool
61	H	36,110	VH	VL	H	Bachelor's degree	Teachers, kindergarten
78	H	37,890	VH	VL	H	Bachelor's degree	Teachers, elementary school
17	L	37,850	VH	VL	H	Bachelor's degree	Teachers, secondary school
44	H	46,630	VH	L	VH	Doctoral degree	Teachers, special education
							College and university faculty[1]
28	-	-	-	-	-	-	
0	VL	37,200	VH	L	VH	Bachelor's degree	Other teachers and instructors
14	L	22,230	L	L	VH	Moderate-term on-the-job	Farm and home management advisors
14	-	-	-	-	-	-	Instructors and coaches, sports and physical training
5	VL	24,800	H	L	VH	Related work experience	Adult and vocational education teachers
9	VL	34,430	H	L	VH	Related work experience	Instructors, adult (nonvocational) education
18	L	27,180	H	L	VH	Bachelor's degree	Teachers and instructors, vocational education and training
							All other teachers and instructors[1]
6	-	-	-	-	-	-	
1	VL	31,750	H	VL	VH	Master's degree	Librarians, archivists, curators, and related workers
5	VL	38,470	VH	VL	VH	Master's degree	Archivists, curators, museum technicians, and conservators[1]
9	VL	38,650	VH	VL	H	Master's degree	Librarians
31	-	-	-	-	-	-	Counselors
2	VL	63,930	VH	VL	H	First professional degree	Health diagnosing occupations
4	VL	110,160	VH	VL	VH	First professional degree	Chiropractors[1]
1	VL	68,500	VH	VL	H	First professional degree	Dentists
21	L	124,000	VH	VL	L	First professional degree	Optometrists[1]
0	VL	79,530	VH	VL	H	First professional degree	Physicians
3	VL	50,950	VH	VL	H	First professional degree	Podiatrists[1]
							Veterinarians[1]
116	-	-	-	-	-	-	
2	VL	35,020	VH	L	VH	Bachelor's degree	Health assessment and treating occupations
6	VL	66,220	VH	VL	H	First professional degree	Dietitians and nutritionists
4	VL	47,090	VH	VL	VH	Bachelor's degree	Pharmacists
79	VH	40,690	VH	VL	VH	Associate degree	Physician assistants[1]
24	-	-	-	-	-	-	Registered nurses
4	VL	48,230	VH	VL	VH	Bachelor's degree	Therapists
6	VL	56,600	VH	VL	VH	Master's degree	Occupational therapists[1]
0	VL	39,640	VH	VL	VH	Associate degree	Physical therapists[1]
1	VL	27,760	H	VL	VH	Bachelor's degree	Radiation therapists[1]
5	VL	34,830	VH	VL	VH	Associate degree	Recreational therapists[1]
6	VL	43,080	VH	VL	VH	Master's degree	Respiratory therapists[1]
2	VL	30,270	H	VL	VH	Bachelor's degree	Speech-language pathologists and audiologists[1]
							All other therapists[1]
83	-	-	-	-	-	-	
7	VL	27,400	H	H	VH	Long-term on-the-job	Writers, artists, and entertainers
1	VL	17,930	L	H	VH	Moderate-term on-the-job	Actors, directors, and producers[1]
14	L	31,690	H	H	VH	Work experience plus degree[3]	Announcers
3	VL	22,210	L	H	VH	Long-term on-the-job	Artists and commercial artists
1	VL	21,430	L	H	VH	Postsecondary vocational	Athletes, coaches, umpires, and related workers
17	-	-	-	-	-	-	Dancers and choreographers[1]
14	L	29,200	H	L	H	Bachelor's degree	Designers
2	VL	31,780	H	L	H	Bachelor's degree	Designers, except interior designers
1	VL	18,180	L	L	H	Moderate-term on-the-job	Interior designers
							Merchandise displayers and window dressers
9	VL	30,020	H	H	VH	Long-term on-the-job	Musicians, singers, and related workers
2	VL	26,470	H	L	H	Bachelor's degree	News analysts, reporters, and correspondents
4	-	-	-	-	-	-	Photographers and camera operators
0	VL	21,530	L	H	VH	Moderate-term on-the-job	Camera operators, television, motion picture, video
3	VL	20,940	L	H	VH	Postsecondary vocational	Photographers

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[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Public relations specialists	122	152	30	L	24.6	VH	10.4	25	VL
Writers and editors, including technical writers	341	424	83	L	24.4	VH	39.8	53	L
All other professional workers[1]	785	952	166	H	21.2	VH	1.3	136	L
Technicians and related support occupations	4,949	6,048	1,098	-	22.1	-	2.1	575	-
Health technicians and technologists	2,447	3,063	616	-	25.1	-	1.1	257	-
Cardiovascular technologists and technicians[1]	21	29	8	VL	39.4	VH	.0	3	VL
Clinical laboratory technologists and technicians	313	366	53	L	17.0	H	.2	20	VL
Dental hygienists	143	201	58	L	40.5	VH	.6	15	VL
EKG technicians[1]	12	10	-3	VL	-23.1	VL	.0	1	VL
Electroneurodiagnostic technologists[1]	5	6	0	VL	5.9	VL	.0	1	VL
Emergency medical technicians and paramedics[1]	150	197	47	L	31.6	VH	.0	23	VL
Licensed practical and licensed vocational nurses	692	828	136	H	19.7	VH	.3	43	L
Medical records and health information technicians[1]	92	133	41	L	43.9	VH	.7	11	VL
Nuclear medicine technologists	14	16	2	VL	11.6	L	.0	1	VL
Opticians, dispensing	71	81	10	VL	13.8	L	7.3	6	VL
Pharmacy technicians[1]	109	126	17	VL	15.7	H	.0	14	VL
Psychiatric technicians	66	73	7	VL	10.9	L	.0	15	VL
Radiologic technologists and technicians	162	194	32	L	20.1	VH	.4	11	VL
Surgical technologists[1]	54	77	23	L	41.8	VH	.0	9	VL
Veterinary technologists and technicians[1]	32	37	5	VL	16.2	H	.0	3	VL
All other health professionals and paraprofessionals[1]	510	688	178	H	35.0	VH	3.4	80	L
Engineering and science technicians and technologists	1,351	1,525	175	-	12.9	-	2.5	175	-
Engineering technicians	771	897	126	-	16.3	-	1.1	114	-
Electrical and electronic technicians and technologists	335	391	56	L	16.8	H	1.7	43	VL
All other engineering technicians and technologists	437	506	70	L	15.9	H	.6	71	L
Drafters	283	301	18	VL	6.4	VL	6.2	30	VL
Science and mathematics technicians[1]	227	243	16	VL	7.0	VL	1.3	17	VL
Surveying and mapping technicians	69	84	15	VL	21.8	VH	6.6	15	VL
Technicians, except health and engineering and science	1,152	1,460	308	-	26.7	-	3.8	142	-
Aircraft pilots and flight engineers	94	99	6	VL	5.9	VL	2.0	5	VL
Air traffic controllers[1]	30	30	1	VL	2.3	VL	.0	2	VL
Broadcast and sound technicians[1]	37	39	2	VL	6.0	VL	5.9	3	VL
Computer programmers	648	839	191	H	29.5	VH	4.8	75	L
Legal assistants and technicians, except clerical	252	346	94	-	37.4	-	3.2	47	-
Paralegals and legal assistants	136	220	84	L	62.0	VH	2.5	34	VL
Title examiners, abstractors, and searchers	30	29	0	VL	-.6	VL	11.1	4	VL
All other legal assistants, including law clerks	86	96	10	VL	11.6	L	1.7	9	VL
Library technicians[1]	72	85	13	VL	18.2	H	.0	9	VL
All other technicians[1]	20	21	1	VL	4.1	VL	1.9	2	VL
Marketing and sales occupations	15,341	17,627	2,287	-	14.9	-	13.4	4,265	-
Cashiers	3,198	3,754	556	VH	17.4	H	.8	1,290	VH
Counter and rental clerks	469	577	108	L	23.1	VH	3.3	199	H
Insurance sales agents	387	396	9	VL	2.2	VL	29.4	39	VL
Marketing and sales worker supervisors	2,584	2,847	263	H	10.2	L	33.9	411	H
Models, demonstrators, and product promoters	92	121	30	L	32.3	VH	6.1	28	VL
Parts salespersons	300	303	4	VL	1.2	VL	.7	35	VL
Real estate agents and brokers	347	382	34	-	9.8	-	70.5	46	-
Brokers, real estate	63	71	8	VL	13.5	L	65.1	9	VL
Sales agents, real estate	285	310	26	L	9.0	L	71.6	37	VL
Retail salespersons	4,056	4,620	563	VH	13.9	L	4.0	1,305	VH
Sales engineers	79	92	12	VL	15.7	H	1.2	3	VL
Securities, commodities, and financial services sales agents	303	427	124	L	41.0	VH	25.7	61	L
Travel agents[1]	138	163	25	L	18.4	H	12.5	17	VL
All other sales and related workers[1]	3,388	3,945	558	VH	16.5	H	15.0	865	VH

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
6	VL	34,550	H	L	H	Bachelor's degree	Public relations specialists
17	L	36,480	VH	L	H	Bachelor's degree	Writers and editors, including technical writers
36	H	36,730	VH	L	H	Bachelor's degree	All other professional workers[1]
220	-	-	-	-	-	-	**Technicians and related support occupations**
112	-	-	-	-	-	-	Health technicians and technologists
1	VL	35,770	VH	L	VH	Associate degree	Cardiovascular technologists and technicians[1]
9	VL	32,440	H	L	H	Bachelor's degree	Clinical laboratory technologists and technicians
9	VL	45,890	VH	L	VH	Associate degree	Dental hygienists
0	VL	24,360	H	L	VH	Moderate-term on-the-job	EKG technicians[1]
0	VL	32,070	H	L	VH	Moderate-term on-the-job	Electroneurodiagnostic technologists[1]
8	VL	20,290	L	L	VH	Postsecondary vocational	Emergency medical technicians and paramedics[1]
28	L	26,940	H	L	VH	Postsecondary vocational	Licensed practical and licensed vocational nurses
6	VL	20,590	L	L	VH	Associate degree	Medical records and health information technicians[1]
0	VL	39,610	VH	VL	VH	Associate degree	Nuclear medicine technologists
2	VL	22,440	L	VL	H	Moderate-term on-the-job	Opticians, dispensing
4	VL	17,770	L	L	VH	Moderate-term on-the-job	Pharmacy technicians[1]
2	VL	20,890	L	H	VH	Postsecondary vocational	Psychiatric technicians
5	VL	32,880	H	VL	VH	Associate degree	Radiologic technologists and technicians
4	VL	25,780	H	L	VH	Postsecondary vocational	Surgical technologists[1]
1	VL	19,870	L	L	H	Associate degree	Veterinary technologists and technicians[1]
30	L	26,940	H	L	VH	Associate degree	All other health professionals and paraprofessionals[1]
48	-	-	-	-	-	-	Engineering and science technicians and technologists
30	-	-	-	-	-	-	Engineering technicians
12	L	35,970	VH	L	L	Associate degree	Electrical and electronic technicians and technologists
18	L	37,310	VH	L	H	Associate degree	All other engineering technicians and technologists
9	VL	32,370	H	L	L	Postsecondary vocational	Drafters
7	VL	31,030	H	L	H	Associate degree	Science and mathematics technicians[1]
3	VL	25,940	H	L	L	Moderate-term on-the-job	Surveying and mapping technicians
59	-	-	-	-	-	-	Technicians, except health and engineering and science
3	VL	91,750	VH	VL	H	Bachelor's degree	Aircraft pilots and flight engineers
1	VL	64,880	VH	L	H	Long-term on-the-job	Air traffic controllers[1]
1	VL	25,270	H	L	H	Postsecondary vocational	Broadcast and sound technicians[1]
39	H	47,550	VH	VL	L	Bachelor's degree	Computer programmers
12	-	-	-	-	-	-	Legal assistants and technicians, except clerical
10	VL	32,760	H	L	H	Associate degree	Paralegals and legal assistants
0	VL	26,850	H	L	H	Moderate-term on-the-job	Title examiners, abstractors, and searchers
2	VL	29,520	H	VL	H	Associate degree	All other legal assistants, including law clerks
3	VL	21,730	L	L	H	Short-term on-the-job	Library technicians[1]
1	VL	27,200	H	L	H	Moderate-term on-the-job	All other technicians[1]
681	-	-	-	-	-	-	**Marketing and sales occupations**
195	VH	13,690	VL	VH	VH	Short-term on-the-job	Cashiers
31	L	14,510	VL	VH	VH	Short-term on-the-job	Counter and rental clerks
10	VL	34,370	H	VL	H	Bachelor's degree	Insurance sales agents
60	H	29,570	H	VL	L	Related work experience	Marketing and sales worker supervisors
5	VL	16,940	L	VH	VH	Moderate-term on-the-job	Models, demonstrators, and product promoters
9	VL	22,730	L	L	H	Moderate-term on-the-job	Parts salespersons
10	-	-	-	-	-	-	Real estate agents and brokers
2	VL	45,640	VH	VL	H	Related work experience	Brokers, real estate
8	VL	28,020	H	VL	H	Postsecondary vocational	Sales agents, real estate
194	VH	15,830	VL	H	VH	Short-term on-the-job	Retail salespersons
3	VL	54,600	VH	VL	VL	Bachelor's degree	Sales engineers
15	L	48,090	VH	VL	L	Bachelor's degree	Securities, commodities, and financial services sales agents
5	VL	23,010	L	L	H	Postsecondary vocational	Travel agents[1]
144	VH	31,140	H	H	VH	Moderate-term on-the-job	All other sales and related workers[1]

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Administrative support occupations, including clerical	24,461	26,659	2,198	-	8.9	-	1.8	4,986	-
Adjusters, investigators, and collectors	1,237	1,540	302	-	24.4	-	.2	292	-
Adjustment clerks	479	642	163	H	34.0	VH	.0	142	L
Bill and account collectors	311	420	110	L	35.3	VH	.6	106	L
Insurance claims, examining and policy processing clerks	339	377	38	-	11.2	-	.0	48	-
Insurance claims clerks	160	183	23	L	14.5	H	.0	13	VL
Insurance examining clerks	10	11	2	VL	17.3	H	.0	2	VL
Insurance policy processing clerks	170	183	13	VL	7.9	VL	.0	33	VL
Welfare eligibility workers and interviewers	109	100	-8	VL	-7.6	VL	.0	2	VL
Communications equipment operators	297	252	-46	-	-15.0	-	.2	64	-
Telephone operators	261	220	-41	-	-15.6	-	.2	57	-
Central office operators	23	19	-4	VL	-16.6	VL	.0	5	VL
Directory assistance operators	23	16	-7	VL	-31.1	VL	.0	5	VL
Switchboard operators	214	185	-30	VL	-13.9	VL	.2	47	L
All other communications equipment operators[1]	36	32	-5	VL	-13.6	VL	.0	8	VL
Computer operators	251	187	-64	-	-25.5	-	2.0	32	-
Peripheral equipment operators[1]	27	17	-10	VL	-37.6	VL	.0	3	VL
Computer operators, except peripheral equipment	224	170	-54	VL	-24.1	VL	2.2	29	VL
Information clerks	1,910	2,296	386	-	20.2	-	1.3	549	-
Hotel, motel, and resort desk clerks	159	180	21	L	13.5	L	.8	60	L
Interviewing clerks, except personnel and social welfare	128	158	30	L	23.3	VH	.4	44	L
New accounts clerks, banking	111	127	16	VL	14.7	H	.0	36	VL
Receptionists and information clerks	1,293	1,599	305	H	23.6	VH	1.8	387	H
Reservation and transportation ticket agents and travel clerks[1]	219	232	13	VL	6.0	VL	.0	23	VL
Mail clerks and messengers	247	270	23	-	9.1	-	4.2	62	-
Couriers and messengers	120	130	11	VL	8.8	L	7.6	35	VL
Mail clerks, except mail machine operators and postal service	128	140	12	VL	9.5	L	.9	26	VL
Postal clerks and mail carriers	405	434	30	-	7.3	-	.0	12	-
Postal mail carriers	332	357	25	L	7.4	VL	.0	7	VL
Postal service clerks	73	78	5	VL	6.8	VL	.0	5	VL
Material recording, scheduling, dispatching, and distributing occupations	4,183	4,382	199	-	4.7	-	.2	876	-
Dispatchers	248	278	30	-	12.1	-	1.2	48	-
Dispatchers, except police, fire, and ambulance	163	186	23	L	14.4	H	1.8	32	VL
Dispatchers, police, fire, and ambulance	85	92	7	VL	8.0	VL	.0	16	VL
Meter readers, utilities[1]	50	51	0	VL	.4	VL	.0	11	VL
Procurement clerks	58	49	-9	VL	-14.8	VL	.1	10	VL
Production, planning, and expediting clerks	248	249	1	VL	.4	VL	1.0	62	L
Shipping, receiving, and traffic clerks	1,000	1,031	31	L	3.1	VL	.2	243	H
Stock clerks and order fillers	2,331	2,462	131	H	5.6	VL	.1	442	VH
Weighers, measurers, checkers, and samplers, recordkeeping[1]	51	51	1	VL	1.5	VL	.4	12	VL
All other material recording, scheduling, and distribution workers[1]	196	210	13	VL	6.8	VL	.0	48	L
Records processing occupations	3,731	3,775	44	-	1.1	-	6.0	670	-
Advertising clerks[1]	14	14	1	VL	4.4	VL	.0	2	VL
Brokerage clerks	77	98	22	L	28.4	VH	.0	18	VL
Correspondence clerks[1]	25	28	3	VL	12.2	L	.0	4	VL
File clerks	272	298	26	L	9.6	L	1.2	117	L
Financial records processing occupations	2,698	2,653	-44	-	-1.6	-	8.1	415	-
Billing, cost, and rate clerks	342	392	50	L	14.6	H	1.1	63	L
Billing and posting clerks and machine operators[1]	107	104	-3	VL	-2.6	VL	3.0	11	VL
Bookkeeping, accounting, and auditing clerks	2,078	1,997	-81	VL	-3.9	VL	10.1	325	H
Payroll and timekeeping clerks	172	161	-11	VL	-6.2	VL	.9	15	VL
Library assistants and bookmobile drivers	127	148	21	L	16.5	H	.0	36	VL

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
746	-	-	-	-	-	-	**Administrative support occupations, including clerical**
50	-	-	-	-	-	-	Adjusters, investigators, and collectors
19	L	22,040	L	L	H	Short-term on-the-job	Adjustment clerks
19	L	22,540	L	H	H	Short-term on-the-job	Bill and account collectors
9	-	-	-	-	-	-	Insurance claims, examining and policy processing clerks
5	VL	24,010	H	VL	L	Moderate-term on-the-job	Insurance claims clerks
0	VL	23,750	H	L	H	Moderate-term on-the-job	Insurance examining clerks
4	VL	23,960	H	L	H	Moderate-term on-the-job	Insurance policy processing clerks
2	VL	33,100	H	L	L	Moderate-term on-the-job	Welfare eligibility workers and interviewers
6	-	-	-	-	-	-	Communications equipment operators
6	-	-	-	-	-	-	Telephone operators
1	VL	26,220	H	H	VH	Moderate-term on-the-job	Central office operators
1	VL	30,530	H	H	VH	Moderate-term on-the-job	Directory assistance operators
5	VL	18,220	L	VH	VH	Short-term on-the-job	Switchboard operators
1	VL	26,400	H	H	VH	Moderate-term on-the-job	All other communications equipment operators[1]
4	-	-	-	-	-	-	Computer operators
0	VL	22,860	L	L	H	Moderate-term on-the-job	Peripheral equipment operators[1]
3	VL	25,030	H	L	H	Moderate-term on-the-job	Computer operators, except peripheral equipment
82	-	-	-	-	-	-	Information clerks
8	VL	15,160	VL	H	VH	Short-term on-the-job	Hotel, motel, and resort desk clerks
7	VL	18,540	L	VH	VH	Short-term on-the-job	Interviewing clerks, except personnel and social welfare
5	VL	21,340	L	VH	VH	Related work experience	New accounts clerks, banking
55	H	18,620	L	H	VH	Short-term on-the-job	Receptionists and information clerks
6	VL	22,120	L	L	H	Short-term on-the-job	Reservation and transportation ticket agents and travel clerks[1]
8	-	-	-	-	-	-	Mail clerks and messengers
4	VL	16,680	VL	H	VH	Short-term on-the-job	Couriers and messengers
4	VL	17,660	L	VH	H	Short-term on-the-job	Mail clerks, except mail machine operators and postal service
13	-	-	-	-	-	-	Postal clerks and mail carriers
12	L	34,840	VH	VL	L	Short-term on-the-job	Postal mail carriers
2	VL	35,100	VH	L	L	Short-term on-the-job	Postal service clerks
90	-	-	-	-	-	-	Material recording, scheduling, dispatching, and distributing occupations
7	-	-	-	-	-	-	Dispatchers
5	VL	26,370	H	L	L	Moderate-term on-the-job	Dispatchers, except police, fire, and ambulance
2	VL	23,670	H	L	L	Moderate-term on-the-job	Dispatchers, police, fire, and ambulance
1	VL	25,380	H	H	H	Short-term on-the-job	Meter readers, utilities[1]
1	VL	22,630	L	H	H	Short-term on-the-job	Procurement clerks
3	VL	29,270	H	L	VH	Short-term on-the-job	Production, planning, and expediting clerks
20	L	22,500	L	H	H	Short-term on-the-job	Shipping, receiving, and traffic clerks
50	H	16,520	VL	H	H	Short-term on-the-job	Stock clerks and order fillers
1	VL	22,310	L	VH	H	Short-term on-the-job	Weighers, measurers, checkers, and samplers, recordkeeping[1]
6	VL	21,070	L	H	H	Short-term on-the-job	All other material recording, scheduling, and distribution workers[1]
94	-	-	-	-	-	-	Records processing occupations
0	VL	20,550	L	L	H	Short-term on-the-job	Advertising clerks[1]
3	VL	27,920	H	L	H	Moderate-term on-the-job	Brokerage clerks
1	VL	22,270	L	L	H	Short-term on-the-job	Correspondence clerks[1]
12	L	16,830	L	VH	VH	Short-term on-the-job	File clerks
56	-	-	-	-	-	-	Financial records processing occupations
12	L	22,670	L	L	H	Short-term on-the-job	Billing, cost, and rate clerks
2	VL	20,560	L	L	H	Short-term on-the-job	Billing and posting clerks and machine operators[1]
39	H	23,190	L	L	VH	Moderate-term on-the-job	Bookkeeping, accounting, and auditing clerks
3	VL	24,560	H	L	H	Short-term on-the-job	Payroll and timekeeping clerks
8	VL	16,980	L	H	VH	Short-term on-the-job	Library assistants and bookmobile drivers

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Order clerks	362	378	17	VL	4.6	VL	.5	57	L
Human resources assistants, except payroll and timekeeping[1]	142	145	3	VL	2.0	VL	.0	22	VL
Statement clerks	16	12	-3	VL	-22.3	VL	10.2	3	VL
Secretaries, stenographers, and typists	3,764	3,744	-19	-	-.5	-	3.0	518	-
Court reporters, medical transcriptionists, and stenographers[1]	110	121	11	VL	9.7	L	31.4	16	VL
Secretaries	3,195	3,258	63	-	1.9	-	1.8	436	-
Legal secretaries	285	322	37	L	13.0	L	.2	44	L
Medical secretaries	219	246	26	L	12.0	L	1.6	34	VL
Secretaries, except legal and medical	2,690	2,691	0	VL	.0	VL	1.9	358	H
Word processors and typists	459	365	-93	VL	-20.4	VL	4.9	65	L
Other clerical and administrative support workers	8,436	9,780	1,344	-	15.9	-	.6	1,931	-
Bank tellers	560	529	-31	VL	-5.5	VL	.0	107	L
Court, municipal, and license clerks	100	112	12	-	11.6	-	.0	26	-
Court clerks	51	57	6	VL	10.8	L	.0	13	VL
License clerks	24	27	3	VL	13.1	L	.0	6	VL
Municipal clerks	25	28	3	VL	11.9	L	.0	7	VL
Credit and loan authorizers, checkers, and clerks	254	271	17	-	6.7	-	.0	63	-
Credit authorizers	17	15	-2	VL	-10.7	VL	.0	4	VL
Credit checkers	41	42	1	VL	1.5	VL	.0	9	VL
Loan and credit clerks	179	200	21	L	11.8	L	.0	47	L
Loan interviewers	16	14	-3	VL	-17.0	VL	.0	4	VL
Data entry keyers	435	474	39	L	9.0	L	2.1	107	L
Duplicating, mail, and other office machine operators[1]	197	201	4	VL	1.9	VL	.2	43	L
Office and administrative support supervisors and managers	1,611	1,924	313	VH	19.4	VH	.1	238	H
Office clerks, general	3,021	3,484	463	VH	15.3	H	.3	745	VH
Proofreaders and copy markers[1]	41	34	-7	VL	-17.1	VL	3.1	9	VL
Statistical clerks	72	69	-3	VL	-4.5	VL	.1	5	VL
Teacher assistants	1,192	1,567	375	VH	31.5	VH	.2	344	H
All other clerical and administrative support workers	953	1,116	162	H	17.0	H	3.1	243	H
Service occupations	22,548	26,401	3,853	-	17.0	-	5.7	6,720	-
Cleaning and building service occupations, except private household	3,623	4,031	408	-	11.2	-	5.0	822	-
Institutional cleaning supervisors	87	97	9	VL	10.5	L	1.8	9	VL
Janitors and cleaners, including maids and housekeeping cleaners	3,184	3,549	365	VH	11.5	L	4.8	736	VH
Pest control workers[1]	52	65	13	VL	25.4	VH	9.0	8	VL
All other cleaning and building service workers[1]	300	320	20	VL	6.7	VL	8.1	68	L
Food preparation and service occupations	8,735	9,831	1,096	-	12.5	-	.9	3,392	-
Chefs, cooks, and other kitchen workers	3,306	3,748	442	-	13.3	-	1.7	1,201	-
Cooks, except short order	1,373	1,560	187	-	13.6	-	3.6	443	-
Bakers, bread and pastry	171	200	28	L	16.6	H	5.2	57	L
Cooks, institution or cafeteria	418	431	12	VL	2.9	VL	.0	124	L
Cooks, restaurant	783	929	146	H	18.7	H	5.1	263	H
Cooks, short order and fast food	677	801	124	H	18.4	H	1.0	226	H
Food preparation workers[1]	1,256	1,387	131	H	10.4	L	.0	529	VH
Food and beverage service occupations	5,150	5,778	628	-	12.0	-	.4	2,081	-
Bartenders	404	412	8	VL	1.9	VL	1.5	86	L
Dining room and cafeteria attendants and bar helpers	405	422	16	VL	4.0	VL	.6	182	H
Food counter, fountain, and related workers[1]	2,025	2,272	247	H	12.2	L	.1	945	VH
Hosts and hostesses, restaurant, lounge, or coffee shop	297	351	54	L	18.2	H	1.1	111	L
Waiters and waitresses	2,019	2,322	303	H	15.0	H	.4	758	VH
All other food preparation and service workers	280	306	26	L	9.4	L	.8	110	L
Health service occupations	2,309	2,984	676	-	29.2	-	1.8	547	-
Ambulance drivers and attendants, except EMTs	19	26	7	VL	35.0	VH	.0	4	VL
Dental assistants	229	325	97	L	42.2	VH	.0	56	L

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characterisitcs, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
10	L	21,550	L	L	H	Short-term on-the-job	Order clerks
3	VL	24,360	H	L	H	Short-term on-the-job	Human resources assistants, except payroll and timekeeping[1]
0	VL	18,640	L	L	H	Short-term on-the-job	Statement clerks
70	-	-	-	-	-	-	Secretaries, stenographers, and typists
3	VL	25,430	H	L	VH	Postsecondary vocational	Court reporters, medical transcriptionists, and stenographers[1]
58	-	-	-	-	-	-	Secretaries
8	VL	30,050	H	L	VH	Postsecondary vocational	Legal secretaries
6	VL	22,390	L	L	VH	Postsecondary vocational	Medical secretaries
44	H	23,560	H	L	VH	Moderate-term on-the-job	Secretaries, except legal and medical
9	VL	22,590	L	H	VH	Moderate-term on-the-job	Word processors and typists
329	-	-	-	-	-	-	Other clerical and administrative support workers
24	L	17,200	L	L	VH	Short-term on-the-job	Bank tellers
3	-	-	-	-	-	-	Court, municipal, and license clerks
1	VL	22,960	L	L	H	Short-term on-the-job	Court clerks
1	VL	22,900	L	L	H	Short-term on-the-job	License clerks
1	VL	22,810	L	L	H	Short-term on-the-job	Municipal clerks
5	-	-	-	-	-	-	Credit and loan authorizers, checkers, and clerks
0	VL	22,990	L	L	H	Short-term on-the-job	Credit authorizers
0	VL	21,550	L	L	H	Short-term on-the-job	Credit checkers
4	VL	22,580	L	L	H	Short-term on-the-job	Loan and credit clerks
0	VL	23,190	L	L	H	Short-term on-the-job	Loan interviewers
7	VL	19,190	L	H	VH	Moderate-term on-the-job	Data entry keyers
8	VL	20,370	L	H	VH	Short-term on-the-job	Duplicating, mail, and other office machine operators[1]
68	H	31,090	H	VL	VL	Related work experience	Office and administrative support supervisors and managers
130	VH	19,580	L	H	VH	Short-term on-the-job	Office clerks, general
1	VL	18,620	L	H	VH	Short-term on-the-job	Proofreaders and copy markers[1]
1	VL	23,380	L	L	H	Moderate-term on-the-job	Statistical clerks
51	H	15,830	VL	H	VH	Short-term on-the-job	Teacher assistants
33	L	23,520	L	L	H	Short-term on-the-job	All other clerical and administrative support workers
1,111	-	-	-	-	-	-	**Service occupations**
116	-	-	-	-	-	-	Cleaning and building service occupations, except private household
3	VL	19,600	L	L	L	Related work experience	Institutional cleaning supervisors
103	VH	15,340	VL	VH	VH	Short-term on-the-job	Janitors and cleaners, including maids and housekeeping cleaners
2	VL	22,490	L	VH	VH	Moderate-term on-the-job	Pest control workers[1]
8	VL	17,910	L	VH	VH	Short-term on-the-job	All other cleaning and building service workers[1]
516	-	-	-	-	-	-	Food preparation and service occupations
167	-	-	-	-	-	-	Chefs, cooks, and other kitchen workers
55	-	-	-	-	-	-	Cooks, except short order
7	VL	16,990	L	VH	VH	Moderate-term on-the-job	Bakers, bread and pastry
12	L	16,090	VL	VH	VH	Long-term on-the-job	Cooks, institution or cafeteria
35	H	16,250	VL	VH	VH	Long-term on-the-job	Cooks, restaurant
30	L	12,720	VL	VH	VH	Short-term on-the-job	Cooks, short order and fast food
82	VH	13,710	VL	VH	VH	Short-term on-the-job	Food preparation workers[1]
336	-	-	-	-	-	-	Food and beverage service occupations
18	L	13,000	VL	H	VH	Short-term on-the-job	Bartenders
14	L	12,550	VL	VH	VH	Short-term on-the-job	Dining room and cafeteria attendants and bar helpers
148	VH	12,600	VL	VH	VH	Short-term on-the-job	Food counter, fountain, and related workers[1]
14	L	13,410	VL	H	VH	Short-term on-the-job	Hosts and hostesses, restaurant, lounge, or coffee shop
142	VH	12,170	VL	VH	VH	Short-term on-the-job	Waiters and waitresses
13	L	14,560	VL	VH	VH	Short-term on-the-job	All other food preparation and service workers
106	-	-	-	-	-	-	Health service occupations
1	VL	16,970	L	L	VH	Short-term on-the-job	Ambulance drivers and attendants, except EMTs
13	L	22,640	L	L	VH	Moderate-term on-the-job	Dental assistants

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[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Medical assistants[1]	252	398	146	H	57.8	VH	0	49	L
Nursing and psychiatric aides	1,461	1,794	332	-	22.7	-	2.9	371	-
Nursing aides, orderlies, and attendants	1,367	1,692	325	VH	23.8	VH	3.1	350	H
Psychiatric aides	95	102	7	VL	7.7	VL	0	21	VL
Occupational therapy assistants and aides[1]	19	26	7	VL	39.8	VH	0	3	VL
Pharmacy aides[1]	61	71	10	VL	15.9	H	0	9	VL
Physical therapy assistants and aides	82	118	36	L	43.7	VH	0	14	VL
All other health service workers	185	226	41	L	22.3	VH	0	36	VL
Personal service occupations	2,934	3,828	894	-	30.4	-	28.9	835	-
Amusement and recreation attendants	337	439	102	L	30.2	VH	.8	142	L
Baggage porters and bellhops[1]	40	45	5	VL	13.7	L	0	10	VL
Child care workers	905	1,141	236	H	26.1	VH	54.6	329	H
Barbers, cosmetologists, and related workers	723	796	73	-	10.0	-	46.6	84	-
Barbers	54	50	-4	VL	-7.3	VL	76.7	2	VL
Hairdressers, hairstylists, and cosmetologists	605	667	62	L	10.2	L	45.4	73	L
Manicurists	49	62	13	VL	26.0	VH	42.3	7	VL
Shampooers	15	17	2	VL	14.5	H	0	2	VL
Flight attendants	99	129	30	L	30.1	VH	1.5	5	VL
Personal care and home health aides[1]	746	1,179	433	VH	58.1	VH	1.9	250	H
Ushers, lobby attendants, and ticket takers[1]	84	99	15	VL	17.6	H	0	23	VL
Private household workers	928	751	-178	-	-19.1	-	0	280	-
Child care workers, private household[2]	306	209	-97	VL	-31.7	VL	0	115	L
Cleaners and servants, private household[1,2]	600	530	-71	VL	-11.8	VL	0	157	L
Cooks, private household[1,2]	5	2	-2	VL	-51.3	VL	0	1	VL
Housekeepers and butlers[1,2]	17	10	-7	VL	-42.4	VL	0	4	VL
Protective service occupations	2,769	3,486	717	-	25.8	-	.9	465	-
Fire fighting occupations	314	334	20	-	6.4	-	.7	20	-
Firefighters	239	251	11	VL	4.7	VL	0	10	VL
Fire fighting and prevention supervisors[1]	60	66	6	VL	10.7	L	.5	9	VL
Fire inspection occupations[1]	15	17	2	VL	17.2	H	12.9	1	VL
Law enforcement occupations	1,147	1,501	354	-	30.8	-	0	143	-
Correctional officers	383	532	148	H	38.7	VH	0	65	L
Police and detectives	727	929	202	-	27.7	-	0	77	-
Detectives and criminal investigators	79	96	17	VL	21.0	VH	0	8	VL
Police and detective supervisors	111	124	13	VL	12.0	L	0	14	VL
Police patrol officers	446	586	141	H	31.6	VH	0	52	L
Sheriffs and deputy sheriffs	91	123	31	L	34.2	VH	0	3	VL
Other law enforcement occupations	37	40	3	VL	9.4	L	0	1	VL
Other protective service workers	1,308	1,651	343	-	26.1	-	1.8	304	-
Crossing guards[1]	54	57	2	VL	4.0	VL	0	10	VL
Guards	1,027	1,321	294	H	28.6	VH	.2	257	H
Private detectives and investigators	61	76	15	VL	24.3	VH	34.8	15	VL
All other protective service workers	166	198	32	L	19.0	H	0	23	VL
All other service workers[1]	1,249	1,490	241	H	19.3	H	8.6	319	H
Agriculture, forestry, fishing, and related occupations	4,435	4,506	71	-	1.0	-	38.3	767	-
Farm operators and managers	1,483	1,309	-174	-	-11.7	-	88.4	145	-
Farmers[2]	1,308	1,135	-173	VL	-13.2	VL	99.5	133	L
Farm managers[2]	175	174	-1	VL	-.6	VL	5.3	11	VL
Farm workers	851	794	-57	VL	-6.6	VL	3.0	157	L
Fishers and fishing vessel operators	51	40	-11	-	-21.7	-	58.3	10	-
Captains and other officers, fishing vessels[1,2]	11	9	-2	VL	-18.6	VL	41.1	2	VL
Fishers[1,2]	40	31	-9	VL	-22.7	VL	63.2	8	VL
Forestry, conservation, and logging occupations	120	116	-4	-	-3.1	-	27.8	18	-
Forest and conservation workers[1]	33	33	0	VL	.7	VL	9.7	5	VL
Timber cutting and logging occupations	87	83	-4	-	-4.5	-	34.6	13	-

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
21	L	20,680	L	L	VH	Moderate-term on-the-job	Medical assistants[1]
54	.	.	.	.	.	.	Nursing and psychiatric aides
52	H	16,820	VL	H	VH	Short-term on-the-job	Nursing aides, orderlies, and attendants
2	VL	22,170	L	H	VH	Short-term on-the-job	Psychiatric aides
1	VL	28,690	H	L	VH	Associate degree	Occupational therapy assistants and aides[1]
2	VL	18,480	L	L	VH	Short-term on-the-job	Pharmacy aides[1]
6	VL	21,870	L	L	VH	Associate degree	Physical therapy assistants and aides
8	VL	19,160	L	L	VH	Short-term on-the-job	All other health service workers
141	.	.	.	.	.	.	Personal service occupations
16	L	12,860	VL	VH	VH	Short-term on-the-job	Amusement and recreation attendants
1	VL	13,340	VL	H	VH	Short-term on-the-job	Baggage porters and bellhops[1]
32	L	13,760	VL	H	VH	Short-term on-the-job	Child care workers
26	.	.	.	.	.	.	Barbers, cosmetologists, and related workers
2	VL	18,470	L	L	VH	Postsecondary vocational	Barbers
22	L	15,150	VL	L	VH	Postsecondary vocational	Hairdressers, hairstylists, and cosmetologists
3	VL	13,490	VL	L	VH	Postsecondary vocational	Manicurists
1	VL	12,570	VL	L	VH	Short-term on-the-job	Shampooers
5	VL	37,800	VH	VL	VH	Long-term on-the-job	Flight attendants
57	H	15,760	VL	H	VH	Short-term on-the-job	Personal care and home health aides[1]
3	VL	12,480	VL	VH	VH	Short-term on-the-job	Ushers, lobby attendants, and ticket takers[1]
28	.	.	.	.	.	.	Private household workers
14	L	10,733	VL	VH	VH	Short-term on-the-job	Child care workers, private household[2]
13	L	14,435	VL	VH	VH	Short-term on-the-job	Cleaners and servants, private household[1,2]
0	VL	n.a.	.	VH	VH	Moderate-term on-the-job	Cooks, private household[1,2]
0	VL	n.a.	.	VH	VH	Moderate-term on-the-job	Housekeepers and butlers[1,2]
149	.	.	.	.	.	.	Protective service occupations
10	.	.	.	.	.	.	Fire fighting occupations
7	VL	31,170	H	VL	VL	Long-term on-the-job	Firefighters
3	VL	44,830	VH	VL	VL	Related work experience	Fire fighting and prevention supervisors[1]
1	VL	40,040	VH	L	VL	Related work experience	Fire inspection occupations[1]
64	.	.	.	.	.	.	Law enforcement occupations
25	L	28,540	H	VL	VL	Long-term on-the-job	Correctional officers
38	.	.	.	.	.	.	Police and detectives
4	VL	46,180	VH	VL	VL	Related work experience	Detectives and criminal investigators
5	VL	48,700	VH	VL	VL	Related work experience	Police and detective supervisors
26	L	37,710	VH	VL	VL	Long-term on-the-job	Police patrol officers
4	VL	29,270	H	VL	VL	Long-term on-the-job	Sheriffs and deputy sheriffs
1	VL	28,830	H	VL	L	Long-term on-the-job	Other law enforcement occupations
74	.	.	.	.	.	.	Other protective service workers
2	VL	14,940	VL	VH	VH	Short-term on-the-job	Crossing guards[1]
55	H	16,240	VL	VH	H	Short-term on-the-job	Guards
3	VL	21,020	L	VH	H	Related work experience	Private detectives and investigators
15	L	17,470	L	VH	VH	Short-term on-the-job	All other protective service workers
55	H	20,360	L	H	VH	Related work experience	All other service workers[1]
136	.	.	.	.	.	.	**Agriculture, forestry, fishing, and related occupations**
23	.	.	.	.	.	.	Farm operators and managers
20	L	n.a.	.	VL	H	Long-term on-the-job	Farmers[2]
3	VL	n.a.	.	VL	H	Work experience plus degree[3]	Farm managers[2]
26	L	12,570	VL	VH	H	Short-term on-the-job	Farm workers
1	.	.	.	.	.	.	Fishers and fishing vessel operators
0	VL	n.a.	.	VH	L	Related work experience	Captains and other officers, fishing vessels[1,2]
1	VL	n.a.	.	VH	L	Short-term on-the-job	Fishers[1,2]
3	.	.	.	.	.	.	Forestry, conservation, and logging occupations
1	VL	23,140	L	VH	L	Short-term on-the-job	Forest and conservation workers[1]
2	.	.	.	.	.	.	Timber cutting and logging occupations

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characterisitcs, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Fallers and buckers	18	16	-2	VL	-11.5	VL	37.5	2	VL
Logging equipment operators	56	55	-1	VL	-2.0	VL	37.2	8	VL
All other timber cutting and related logging workers	13	12	-1	VL	-6.0	VL	19.2	2	VL
Landscaping, groundskeeping, nursery, greenhouse, and lawn service occupations	1,285	1,548	262	-	20.4	-	19.0	310	-
Laborers, landscaping and groundskeeping[1]	1,130	1,364	234	H	20.7	VH	16.1	283	H
Lawn service managers[1]	86	104	17	VL	20.0	VH	71.1	10	VL
Nursery and greenhouse managers[1]	5	6	1	VL	15.1	H	19.5	1	VL
Pruners	45	50	5	VL	12.1	L	.0	11	VL
Sprayers/applicators	19	23	4	VL	23.6	VH	.0	5	VL
Supervisors, farming, forestry, and agricutural related occupations[1]	92	97	6	VL	6.2	VL	13.9	12	VL
Veterinary assistants and nonfarm animal caretakers	181	223	42	-	23.0	-	19.4	58	-
Animal caretakers, except farm	137	166	30	L	21.6	VH	25.7	43	L
Veterinary assistants	45	57	12	VL	28.0	VH	.0	15	VL
All other agricultural, forestry, fishing, and related workers[1]	373	379	6	VL	1.7	VL	1.7	71	L
Precision production, craft, and repair occupations	15,619	16,871	1,252	-	8.0	-	12.1	2,118	-
Blue-collar worker supervisors[1]	2,198	2,394	196	H	8.9	L	10.4	216	H
Construction trades	4,628	5,018	390	-	8.4	-	21.3	762	-
Boilermakers[1]	18	19	0	VL	1.6	VL	6.6	2	VL
Bricklayers, blockmasons, and stonemasons[1]	157	176	19	VL	12.3	L	27.6	30	VL
Carpenters	1,071	1,145	74	L	6.9	VL	32.1	236	H
Carpet, floor, and tile installers and finishers	138	147	8	-	6.0	-	53.2	21	-
Carpet installers	85	88	3	VL	3.6	VL	64.0	11	VL
Hard tile setters[1]	29	31	3	VL	8.7	L	39.0	5	VL
All other carpet, floor, and tile installers and finishers	25	28	3	VL	11.0	L	33.0	4	VL
Ceiling tile installers and acoustical carpenters	16	17	1	VL	8.9	L	.0	3	VL
Concrete finishers, cement masons, and terrazzo workers	139	148	9	VL	6.1	VL	5.0	14	VL
Construction equipment operators	321	346	25	-	7.0	-	6.3	39	-
Grader, bulldozer, and scraper operators	122	129	7	VL	5.7	VL	6.5	6	VL
Operating engineers	126	135	10	VL	7.9	VL	8.7	20	VL
Paving, surfacing, and tamping equipment operators[1]	74	82	8	VL	10.6	L	2.0	14	VL
Drywall installers and finishers	163	175	12	VL	7.5	VL	25.6	33	VL
Electricians	656	724	68	L	10.3	L	10.5	93	L
Elevator installers and repairers	30	33	4	VL	12.2	L	1.1	5	VL
Glaziers[1]	44	46	2	VL	3.9	VL	12.9	8	VL
Hazardous materials removal workers	38	45	7	VL	19.3	VH	.0	5	VL
Highway maintenance workers	155	173	17	VL	11.1	L	.0	21	VL
Insulation workers	67	72	5	VL	7.5	VL	4.1	7	VL
Painters and paperhangers	476	517	41	L	8.6	L	43.7	87	L
Pipelayers and pipelaying fitters	57	60	3	VL	4.9	VL	11.0	7	VL
Plasterers and stucco masons[1]	40	47	7	VL	17.1	H	16.9	8	VL
Plumbers, pipefitters, and steamfitters	426	449	22	L	5.3	VL	19.5	58	L
Roofers	158	177	19	VL	12.0	L	31.9	29	VL
Sheet metal workers and duct installers[1]	230	262	32	L	14.1	H	2.2	23	VL
Structural and reinforcing metal workers	81	87	6	VL	8.0	VL	1.9	14	VL
All other construction trades workers[1]	146	155	8	VL	5.7	VL	11.0	18	VL
Extractive and related workers, including blasters	244	255	11	-	4.4	-	1.7	19	-
Oil and gas extraction occupations	69	63	-6	-	-9.0	-	.0	4	-
Roustabouts, oil and gas[1]	30	23	-6	VL	-21.1	VL	.0	2	VL
All other oil and gas extraction occupations[1]	40	40	0	VL	.0	VL	.0	2	VL
Mining, quarrying, and tunneling occupations[1]	23	18	-4	VL	-19.1	VL	2.2	1	VL
All other extraction and related workers[1]	152	173	21	L	14.1	H	2.4	14	VL
Mechanics, installers, and repairers	5,176	5,763	588	-	11.3	-	8.8	690	-

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[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
0	VL	23,510	L	VH	L	Short-term on-the-job	Fallers and buckers
1	VL	23,150	L	VH	L	Moderate-term on-the-job	Logging equipment operators
0	VL	24,230	H	VH	L	Short-term on-the-job	All other timber cutting and related logging workers
63	-	-	-	-	-	-	Landscaping, groundskeeping, nursery, greenhouse, and lawn service occupations
57	H	17,140	L	VH	H	Short-term on-the-job	Laborers, landscaping and groundskeeping[1]
2	VL	25,420	H	VL	H	Related work experience	Lawn service managers[1]
0	VL	25,360	H	VL	H	Related work experience	Nursery and greenhouse managers[1]
2	VL	22,070	L	VH	H	Short-term on-the-job	Pruners
1	VL	21,650	L	VH	H	Moderate-term on-the-job	Sprayers/applicators
2	VL	24,560	H	VL	H	Related work experience	Supervisors, farming, forestry, and agricutural related occupations[1]
7	-	-	-	-	-	-	Veterinary assistants and nonfarm animal caretakers
5	VL	14,820	VL	H	VH	Short-term on-the-job	Animal caretakers, except farm
2	VL	16,200	VL	H	VH	Short-term on-the-job	Veterinary assistants
11	L	15,760	VL	VH	H	Short-term on-the-job	All other agricultural, forestry, fishing, and related workers[1]
505	-	-	-	-	-	-	**Precision production, craft, and repair occupations**
80	VH	37,180	VH	L	VL	Related work experience	Blue-collar worker supervisors[1]
143	-	-	-	-	-	-	Construction trades
0	VL	38,380	VH	L	VL	Long-term on-the-job	Boilermakers[1]
5	VL	35,200	VH	VH	L	Long-term on-the-job	Bricklayers, blockmasons, and stonemasons[1]
36	H	28,740	H	VH	L	Long-term on-the-job	Carpenters
4	-	-	-	-	-	-	Carpet, floor, and tile installers and finishers
2	VL	26,480	H	H	H	Moderate-term on-the-job	Carpet installers
1	VL	33,810	H	VH	L	Long-term on-the-job	Hard tile setters[1]
1	VL	25,840	H	VH	L	Moderate-term on-the-job	All other carpet, floor, and tile installers and finishers
1	VL	31,750	H	VH	L	Moderate-term on-the-job	Ceiling tile installers and acoustical carpenters
3	VL	25,770	H	VH	L	Long-term on-the-job	Concrete finishers, cement masons, and terrazzo workers
8	-	-	-	-	-	-	Construction equipment operators
2	VL	26,920	H	VH	VL	Moderate-term on-the-job	Grader, bulldozer, and scraper operators
3	VL	35,260	VH	VH	VL	Moderate-term on-the-job	Operating engineers
3	VL	24,510	H	VH	L	Moderate-term on-the-job	Paving, surfacing, and tamping equipment operators[1]
3	VL	29,920	H	VH	L	Moderate-term on-the-job	Drywall installers and finishers
20	L	35,310	VH	L	VL	Long-term on-the-job	Electricians
1	VL	47,860	VH	L	L	Long-term on-the-job	Elevator installers and repairers
1	VL	26,410	H	VH	L	Long-term on-the-job	Glaziers[1]
2	VL	27,620	H	VH	L	Moderate-term on-the-job	Hazardous materials removal workers
5	VL	24,490	H	VH	L	Short-term on-the-job	Highway maintenance workers
3	VL	25,490	H	VH	L	Moderate-term on-the-job	Insulation workers
16	L	25,110	H	VH	L	Moderate-term on-the-job	Painters and paperhangers
2	VL	25,690	H	VH	L	Moderate-term on-the-job	Pipelayers and pipelaying fitters
2	VL	29,390	H	VH	L	Long-term on-the-job	Plasterers and stucco masons[1]
8	VL	34,670	H	H	VL	Long-term on-the-job	Plumbers, pipefitters, and steamfitters
7	VL	25,340	H	VH	H	Moderate-term on-the-job	Roofers
9	VL	28,030	H	H	VL	Moderate-term on-the-job	Sheet metal workers and duct installers[1]
3	VL	32,880	H	VH	L	Long-term on-the-job	Structural and reinforcing metal workers
4	VL	25,390	H	VH	L	Moderate-term on-the-job	All other construction trades workers[1]
8	-	-	-	-	-	-	Extractive and related workers, including blasters
2	-	-	-	-	-	-	Oil and gas extraction occupations
1	VL	19,780	L	H	VL	Short-term on-the-job	Roustabouts, oil and gas[1]
1	VL	25,540	H	H	VL	Moderate-term on-the-job	All other oil and gas extraction occupations[1]
1	VL	32,660	H	H	VL	Long-term on-the-job	Mining, quarrying, and tunneling occupations[1]
6	VL	27,270	H	H	VL	Moderate-term on-the-job	All other extraction and related workers[1]
184	-	-	-	-	-	-	Mechanics, installers, and repairers

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[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Electrical and electronic equipment mechanics, installers, and repairers	409	472	63	-	15.3	-	8.5	52	-
Computer, automated teller, and office machine repairers	138	184	46	-	33.7	-	11.6	22	-
Data processing equipment repairers	79	117	37	L	47.0	VH	17.9	20	VL
Office machine and cash register servicers	58	67	9	VL	15.6	H	3.2	3	VL
Telecommunications equipment mechanics, installers, and repairers	125	138	13	-	10.0	-	1.3	13	-
Radio mechanics	7	7	0	VL	-1.4	VL	.0	1	VL
Telephone equipment installers and repairers	69	75	6	-	8.8	-	2.4	6	-
Central office and PBX installers and repairers[1]	44	59	14	VL	32.3	VH	3.8	5	VL
Station installers and repairers, telephone[1]	24	16	-8	VL	-33.8	VL	.0	1	VL
All other telecommunications equipment mechanics, installers, and repairers[1]	49	56	7	VL	13.3	L	.0	6	VL
Miscellaneous electrical and electronic equipment mechanics, installers, and repairers	146	150	4	-	2.6	-	11.7	17	-
Electronic home entertainment equipment repairers	36	31	-4	VL	-11.9	VL	21.3	4	VL
Electronics repairers, commercial and industrial equipment	72	81	9	VL	12.7	L	10.6	10	VL
All other electrical and electronic equipment mechanics, installers, and repairers	39	38	-1	VL	-2.4	VL	4.7	3	VL
Machinery mechanics, installers, and repairers	1,850	1,967	117	-	6.3	-	3.8	222	-
Industrial machinery mechanics[1]	535	559	24	L	4.4	VL	3.4	37	VL
Maintenance repairers, general utility	1,232	1,327	95	L	7.7	VL	4.2	181	H
Millwrights	82	81	-2	VL	-1.9	VL	.1	5	VL
Vehicle and mobile equipment mechanics and repairers	1,612	1,828	216	-	13.4	-	15.7	219	-
Aircraft mechanics and service technicians[1]	133	147	14	VL	10.4	L	.4	11	VL
Automotive body and related repairers	227	263	36	L	15.8	H	16.0	33	VL
Automotive mechanics and service technicians[1]	790	922	132	H	16.7	H	22.2	119	L
Bus and truck mechanics and diesel engine specialists	255	280	25	L	9.8	L	5.8	22	VL
Farm equipment mechanics[1]	49	47	-3	VL	-5.2	VL	10.6	8	VL
Mobile heavy equipment mechanics	106	116	10	VL	9.3	L	5.0	19	VL
Motorcycle, boat, and small engine mechanics	52	54	2	-	4.7	-	30.5	8	-
Motorcycle mechanics[1]	14	14	1	VL	3.9	VL	30.4	2	VL
Small engine mechanics[1]	38	40	2	VL	5.0	VL	30.5	6	VL
Other mechanics, installers, and repairers	1,305	1,496	191	-	14.6	-	7.6	197	-
Bicycle repairers	11	13	2	VL	22.6	VH	24.5	2	VL
Camera and photographic equipment repairers[1]	9	10	1	VL	8.2	VL	63.9	1	VL
Coin, vending, and amusement machine servicers and repairers	27	31	4	VL	15.6	H	.0	4	VL
Heating, air conditioning, and refrigeration mechanics and installers	286	334	48	L	16.9	H	15.0	30	VL
Home appliance and power tool repairers[1]	51	54	3	VL	5.6	VL	15.0	8	VL
Line installers and repairers	279	335	56	-	19.9	-	.7	24	-
Electrical powerline installers and repairers	99	100	1	VL	1.1	VL	1.4	6	VL
Telephone and cable TV line installers and repairers[1]	180	235	55	L	30.3	VH	.3	18	VL
Locksmiths and safe repairers[1]	27	30	3	VL	10.0	L	32.2	5	VL
Medical equipment repairers	11	12	1	VL	13.5	L	.0	2	VL
Musical instrument repairers and tuners[1]	13	13	1	VL	6.5	VL	64.1	2	VL
Precision instrument repairers[1]	33	32	-1	VL	-4.0	VL	8.4	5	VL
Riggers	11	11	0	VL	.5	VL	.0	2	VL
Tire repairers and changers	83	92	9	VL	10.4	L	3.1	26	VL
Watch repairers[1]	8	8	0	VL	-4.2	VL	63.7	1	VL
All other mechanics, installers, and repairers[1]	455	520	65	L	14.3	H	2.3	85	L
Production occupations, precision	2,971	3,010	39	-	1.3	-	6.9	395	-
Assemblers, precision	422	442	20	-	4.6	-	.8	68	-
Aircraft assemblers, precision[1]	17	20	3	VL	19.3	VH	.0	2	VL
Electrical and electronic equipment assemblers, precision	201	213	12	VL	6.0	VL	1.7	39	VL

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[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characterisitcs, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
							Electrical and electronic equipment mechanics, installers, and repairers
18	-	-	-	-	-	-	Computer, automated teller, and office machine repairers
7	-	-	-	-	-	-	Data processing equipment repairers
5	VL	29,340	H	L	L	Postsecondary vocational	Office machine and cash register servicers
2	VL	27,830	H	H	L	Long-term on-the-job	
							Telecommunications equipment mechanics, installers, and repairers
6	-	-	-	-	-	-	Radio mechanics
0	VL	30,590	H	L	L	Postsecondary vocational	Telephone equipment installers and repairers
4	-	-	-	-	-	-	Central office and PBX installers and repairers[1]
3	VL	43,680	VH	VL	VL	Postsecondary vocational	Station installers and repairers, telephone[1]
1	VL	39,630	VH	VL	VL	Postsecondary vocational	All other telecommunications equipment mechanics, installers, and repairers[1]
2	VL	42,850	VH	L	L	Postsecondary vocational	
							Miscellaneous electrical and electronic equipment mechanics, installers, and repairers
5	-	-	-	-	-	-	Electronic home entertainment equipment repairers
1	VL	23,540	L	L	L	Postsecondary vocational	Electronics repairers, commercial and industrial equipment
3	VL	35,590	VH	L	L	Postsecondary vocational	All other electrical and electronic equipment mechanics, installers, and repairers
1	VL	31,300	H	L	VL	Postsecondary vocational	Machinery mechanics, installers, and repairers
54	-	-	-	-	-	-	Industrial machinery mechanics[1]
14	L	31,850	H	L	VL	Long-term on-the-job	Maintenance repairers, general utility
37	H	23,290	L	L	L	Long-term on-the-job	Millwrights
2	VL	36,940	VH	VH	VL	Long-term on-the-job	
62	-	-	-	-	-	-	Vehicle and mobile equipment mechanics and repairers
4	VL	38,060	VH	VL	VL	Postsecondary vocational	Aircraft mechanics and service technicians[1]
10	VL	27,400	H	H	L	Long-term on-the-job	Automotive body and related repairers
33	L	27,360	H	H	L	Postsecondary vocational	Automotive mechanics and service technicians[1]
8	VL	29,340	H	L	VL	Long-term on-the-job	Bus and truck mechanics and diesel engine specialists
1	VL	22,750	L	L	VL	Long-term on-the-job	Farm equipment mechanics[1]
4	VL	31,520	H	L	VL	Long-term on-the-job	Mobile heavy equipment mechanics
2	-	-	-	-	-	-	Motorcycle, boat, and small engine mechanics
0	VL	23,440	L	L	VL	Long-term on-the-job	Motorcycle mechanics[1]
1	VL	21,580	L	L	VL	Long-term on-the-job	Small engine mechanics[1]
51	-	-	-	-	-	-	Other mechanics, installers, and repairers
0	VL	15,700	VL	L	L	Moderate-term on-the-job	Bicycle repairers
0	VL	28,320	H	L	L	Moderate-term on-the-job	Camera and photographic equipment repairers[1]
1	VL	23,260	L	L	L	Long-term on-the-job	Coin, vending, and amusement machine servicers and repairers
10	VL	29,160	H	L	VL	Long-term on-the-job	Heating, air conditioning, and refrigeration mechanics and installers
2	VL	26,010	H	L	L	Long-term on-the-job	Home appliance and power tool repairers[1]
14	-	-	-	-	-	-	Line installers and repairers
2	VL	42,600	VH	VL	VL	Long-term on-the-job	Electrical powerline installers and repairers
11	L	32,750	H	VL	VL	Long-term on-the-job	Telephone and cable TV line installers and repairers[1]
1	VL	24,890	H	L	L	Moderate-term on-the-job	Locksmiths and safe repairers[1]
0	VL	34,190	H	L	L	Long-term on-the-job	Medical equipment repairers
0	VL	23,010	L	L	L	Long-term on-the-job	Musical instrument repairers and tuners[1]
1	VL	39,580	VH	L	L	Long-term on-the-job	Precision instrument repairers[1]
0	VL	31,770	H	L	L	Long-term on-the-job	Riggers
5	VL	16,810	VL	VH	VH	Short-term on-the-job	Tire repairers and changers
0	VL	24,590	H	L	L	Long-term on-the-job	Watch repairers[1]
16	L	29,240	H	L	L	Long-term on-the-job	All other mechanics, installers, and repairers[1]
74	-	-	-	-	-	-	Production occupations, precision
12	-	-	-	-	-	-	Assemblers, precision
1	VL	38,400	VH	L	VL	Related work experience	Aircraft assemblers, precision[1]
6	VL	21,740	L	VH	VL	Related work experience	Electrical and electronic equipment assemblers, precision

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characterisitcs, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Electromechanical equipment assemblers, precision	50	52	3	VL	5.7	VL	.0	10	VL
Fitters, structural metal, precision[1]	17	15	-2	VL	-13.0	VL	.0	2	VL
Machine builders and other precision machine assemblers[1]	74	76	1	VL	1.7	VL	.0	9	VL
All other precision assemblers[1]	64	66	2	VL	3.7	VL	.0	8	VL
Food workers, precision	310	303	-7	-	-2.3	-	7.9	36	-
Bakers, manufacturing	55	60	5	VL	8.5	L	28.8	11	VL
Butchers and meatcutters	216	201	-15	VL	-7.1	VL	3.3	18	VL
All other precision food and tobacco workers[1]	39	42	3	VL	8.5	L	3.5	7	VL
Inspectors, testers, and graders, precision	689	667	-22	VL	-3.2	VL	.6	96	L
Metal workers, precision[1]	707	734	27	-	3.7	-	4.4	74	-
Jewelers and precious stone and metal workers[1]	30	28	-2	VL	-6.0	VL	32.1	3	VL
Machinists	426	452	26	L	6.2	VL	2.5	42	VL
Numerical control machine tool programmers	8	9	1	VL	6.1	VL	.0	1	VL
Shipfitters[1]	9	8	0	VL	-4.5	VL	.0	1	VL
Tool and die makers	138	136	-2	VL	-1.5	VL	1.1	15	VL
All other precision metal workers[1]	97	101	4	VL	4.0	VL	9.8	11	VL
Printing workers, precision	138	137	-1	-	-1.0	-	4.0	24	-
Bookbinders[1]	7	6	-1	VL	-15.2	VL	5.2	1	VL
Prepress printing workers, precision	115	114	0	-	-.4	-	4.6	20	-
Camera operators[1]	9	6	-3	VL	-31.4	VL	.0	1	VL
Compositors and typesetters, precision[1]	14	11	-3	VL	-18.9	VL	38.2	2	VL
Desktop publishing specialists[1]	26	44	19	VL	72.6	VH	.0	8	VL
Film strippers, printing[1]	23	15	-8	VL	-33.0	VL	.0	3	VL
Job printers	17	18	1	VL	4.3	VL	.0	3	VL
Paste-up workers[1]	9	4	-5	VL	-51.2	VL	.0	1	VL
Photoengravers[1]	3	1	-1	VL	-51.5	VL	.0	0	VL
Platemakers[1]	15	14	-1	VL	-5.2	VL	.0	2	VL
All other printing workers, precision[1]	17	17	0	VL	.2	VL	.0	3	VL
Textile, apparel, and furnishings workers, precision	234	226	-8	-	-3.3	-	31.3	23	-
Custom tailors and sewers	74	67	-6	VL	-8.4	VL	56.5	6	VL
Patternmakers and layout workers, fabric and apparel[1]	16	15	-1	VL	-3.8	VL	.0	1	VL
Shoe and leather workers and repairers, precision[1]	23	19	-4	VL	-17.6	VL	24.3	2	VL
Upholsterers[1]	66	67	1	VL	.9	VL	36.2	5	VL
All other precision textile, apparel, and furnishings workers[1]	55	58	2	VL	4.4	VL	3.7	9	VL
Woodworkers, precision	229	236	7	-	2.8	-	15.1	35	-
Cabinetmakers and bench carpenters	123	129	6	VL	5.2	VL	18.9	20	VL
Furniture finishers[1]	38	38	0	VL	-1.0	VL	27.1	5	VL
Wood machinists	40	41	1	VL	3.2	VL	.0	6	VL
All other precision woodworkers[1]	27	27	-1	VL	-2.5	VL	3.2	4	VL
Other precision workers	242	266	25	-	10.2	-	12.2	38	-
Dental laboratory technicians, precision	44	44	0	VL	1.0	VL	20.1	3	VL
Ophthalmic laboratory technicians	23	24	1	VL	4.7	VL	.0	2	VL
Photographic process workers, precision	18	19	1	VL	7.0	VL	51.2	4	VL
All other precision workers	157	179	22	L	14.0	L	7.3	29	VL
Plant and system occupations	403	431	28	-	6.0	-	.7	35	-
Chemical plant and system operators[1]	43	48	5	VL	11.0	L	.0	3	VL
Electric power generating plant operators, distributors, and dispatchers	45	44	-1	-	-1.5	-	.0	3	-
Power distributors and dispatchers[1]	14	12	-2	VL	-12.2	VL	.0	1	VL
Power generating and reactor plant operators[1]	31	32	1	VL	3.1	VL	.0	2	VL
Gas and petroleum plant and system occupations[1]	38	33	-5	VL	-12.6	VL	.0	2	VL
Stationary engineers	31	29	-2	VL	-5.7	VL	3.8	2	VL
Water and liquid waste treatment plant and system operators	98	112	14	VL	14.2	H	.0	13	VL
All other plant and system operators[1]	148	164	16	VL	11.1	L	1.2	12	VL

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characterisitcs, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
1	VL	23,250	L	VH	VL	Related work experience	Electromechanical equipment assemblers, precision
0	VL	26,180	H	L	VL	Related work experience	Fitters, structural metal, precision[1]
2	VL	29,250	H	L	VL	Related work experience	Machine builders and other precision machine assemblers[1]
2	VL	22,110	L	L	VL	Related work experience	All other precision assemblers[1]
8	-	-	-	-	-	-	Food workers, precision
1	VL	22,030	L	H	VH	Moderate-term on-the-job	Bakers, manufacturing
5	VL	20,420	L	H	L	Long-term on-the-job	Butchers and meatcutters
2	VL	22,400	L	H	H	Long-term on-the-job	All other precision food and tobacco workers[1]
15	L	23,470	L	H	L	Related work experience	Inspectors, testers, and graders, precision
18	-	-	-	-	-	-	Metal workers, precision[1]
1	VL	23,820	H	L	VL	Postsecondary vocational	Jewelers and precious stone and metal workers[1]
11	L	28,860	H	L	VL	Long-term on-the-job	Machinists
0	VL	40,490	VH	L	H	Related work experience	Numerical control machine tool programmers
0	VL	28,840	H	L	VL	Long-term on-the-job	Shipfitters[1]
3	VL	37,250	VH	VL	VL	Long-term on-the-job	Tool and die makers
3	VL	26,300	H	L	VL	Long-term on-the-job	All other precision metal workers[1]
4	-	-	-	-	-	-	Printing workers, precision
0	VL	20,690	L	H	L	Moderate-term on-the-job	Bookbinders[1]
4	-	-	-	-	-	-	Prepress printing workers, precision
0	VL	24,370	H	L	L	Long-term on-the-job	Camera operators[1]
0	VL	22,560	L	L	L	Long-term on-the-job	Compositors and typesetters, precision[1]
2	VL	29,130	H	L	L	Long-term on-the-job	Desktop publishing specialists[1]
0	VL	32,300	H	L	L	Long-term on-the-job	Film strippers, printing[1]
0	VL	24,100	H	L	L	Long-term on-the-job	Job printers
0	VL	19,830	L	L	L	Long-term on-the-job	Paste-up workers[1]
0	VL	28,430	H	L	L	Long-term on-the-job	Photoengravers[1]
0	VL	28,600	H	L	L	Long-term on-the-job	Platemakers[1]
0	VL	30,420	H	L	L	Long-term on-the-job	All other printing workers, precision[1]
5	-	-	-	-	-	-	Textile, apparel, and furnishings workers, precision
1	VL	18,630	L	H	VH	Related work experience	Custom tailors and sewers
0	VL	21,580	L	H	H	Long-term on-the-job	Patternmakers and layout workers, fabric and apparel[1]
0	VL	16,610	VL	H	H	Long-term on-the-job	Shoe and leather workers and repairers, precision[1]
1	VL	22,050	L	L	H	Long-term on-the-job	Upholsterers[1]
1	VL	16,790	VL	VH	VH	Long-term on-the-job	All other precision textile, apparel, and furnishings workers[1]
4	-	-	-	-	-	-	Woodworkers, precision
2	VL	22,390	L	L	L	Long-term on-the-job	Cabinetmakers and bench carpenters
1	VL	19,880	L	L	L	Long-term on-the-job	Furniture finishers[1]
1	VL	19,980	L	L	L	Long-term on-the-job	Wood machinists
1	VL	22,430	L	L	L	Long-term on-the-job	All other precision woodworkers[1]
8	-	-	-	-	-	-	Other precision workers
1	VL	25,660	H	VL	H	Long-term on-the-job	Dental laboratory technicians, precision
0	VL	19,530	L	VL	H	Long-term on-the-job	Ophthalmic laboratory technicians
1	VL	21,620	L	H	VH	Moderate-term on-the-job	Photographic process workers, precision
6	VL	22,720	L	H	L	Long-term on-the-job	All other precision workers
15	-	-	-	-	-	-	Plant and system occupations
2	VL	39,030	VH	VL	VL	Long-term on-the-job	Chemical plant and system operators[1]
2	-	-	-	-	-	-	Electric power generating plant operators, distributors, and dispatchers
0	VL	45,690	VH	VL	VL	Long-term on-the-job	Power distributors and dispatchers[1]
1	VL	44,840	VH	VL	VL	Long-term on-the-job	Power generating and reactor plant operators[1]
1	VL	43,820	VH	VL	VL	Long-term on-the-job	Gas and petroleum plant and system occupations[1]
1	VL	38,270	VH	VL	VL	Long-term on-the-job	Stationary engineers
4	VL	29,660	H	VL	VL	Long-term on-the-job	Water and liquid waste treatment plant and system operators
6	VL	22,580	L	VL	VL	Long-term on-the-job	All other plant and system operators[1]

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Operators, fabricators, and laborers	18,588	20,341	1,753	-	9.4	-	3.4	3,941	-
Machine setters, set-up operators, operators, and tenders	5,139	5,230	91	-	1.7	-	1.8	812	-
Numerical control machine tool operators and tenders, metal and plastic[1]	88	108	20	VL	22.6	VH	.0	19	VL
Combination machine tool setters, set-up operators, operators, and tenders, metal and plastic[1]	107	122	15	VL	13.8	L	.0	21	VL
Machine tool cut and form setters, operators, and tenders, metal and plastic	726	690	-36	-	-4.9	-	.7	83	-
Drilling and boring machine tool setters and set-up operators, metal and plastic[1]	42	34	-8	VL	-18.3	VL	.0	7	VL
Grinding, lapping, and buffing machine tool setters and set-up operators, metal and plastic	75	68	-7	VL	-9.6	VL	4.6	4	VL
Lathe and turning machine tool setters and set-up operators, metal and plastic[1]	72	66	-6	VL	-8.4	VL	.0	12	VL
Machine forming operators and tenders, metal and plastic	163	157	-6	VL	-3.9	VL	.0	16	VL
Machine tool cutting operators and tenders, metal and plastic	109	88	-22	VL	-19.9	VL	.0	6	VL
Punching machine setters and set-up operators, metal and plastic	47	44	-4	VL	-7.5	VL	.2	6	VL
All other machine tool setters, set-up operators, metal and plastic[1]	218	235	17	VL	7.7	VL	.6	34	VL
Metal fabricating machine setters, operators, and related workers	167	178	10	-	6.1	-	.0	22	-
Metal fabricators, structural metal products[1]	46	49	3	VL	7.5	VL	.0	9	VL
Soldering and brazing machine operators and tenders[1]	12	13	1	VL	8.2	VL	.0	2	VL
Welding machine setters, operators, and tenders	110	116	6	VL	5.4	VL	.0	11	VL
Metal and plastic processing machine setters, operators, and related workers	478	528	50	-	10.5	-	.0	55	-
Electrolytic plating machine setters, set-up operators, operators, and tenders, metal and plastic[1]	45	49	4	VL	9.6	L	.0	5	VL
Foundry mold assembly and shake out workers	9	10	0	VL	2.5	VL	.0	1	VL
Furnace operators and tenders[1]	23	22	-1	VL	-5.0	VL	.0	2	VL
Heat treating, annealing, and tempering machine operators and tenders, metal and plastic[1]	23	22	-1	VL	-4.1	VL	.0	2	VL
Metal molding machine setters, set-up operators, operators, and tenders	58	63	5	VL	9.0	L	.0	6	VL
Plastic molding machine setters, set-up operators, operators, and tenders	171	196	25	L	14.7	H	.0	21	VL
All other metal and plastic machine setters, operators, and related workers[1]	148	166	18	VL	11.9	L	.0	17	VL
Printing, binding, and related workers	406	410	4	-	1.0	-	2.1	64	-
Bindery machine operators and set-up operators[1]	90	100	10	VL	11.5	L	.0	16	VL
Prepress printing workers, production	20	11	-9	-	-44.7	-	.0	3	-
Photoengraving and lithographic machine operators and tenders[1]	7	6	-1	VL	-15.0	VL	.0	1	VL
Typesetting and composing machine operators and tenders[1]	13	5	-8	VL	-59.8	VL	.0	2	VL
Printing press operators	225	225	0	-	.1	-	3.8	33	-
Letterpress operators	10	8	-2	VL	-18.2	VL	.0	1	VL
Offset lithographic press operators	63	54	-9	VL	-14.7	VL	4.5	8	VL
Printing press machine setters, operators and tenders	142	154	12	VL	8.3	VL	4.1	22	VL
All other printing press setters and set-up operators	10	9	0	VL	-4.5	VL	.0	1	VL
Screen printing machine setters and set-up operators	28	29	1	VL	3.0	VL	.0	4	VL
All other printing, binding, and related workers[1]	43	45	2	VL	4.1	VL	.0	7	VL
Textile and related setters, operators, and related workers	851	687	-164	-	-19.2	-	2.5	108	-
Extruding and forming machine operators and tenders, synthetic or glass fibers[1]	33	35	3	VL	7.9	VL	.0	6	VL
Pressing machine operators and tenders, textile, garment, and related materials	69	66	-3	VL	-4.0	VL	.0	10	VL
Sewing machine operators, garment	369	257	-112	VL	-30.3	VL	3.6	42	VL

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[3] Bachelor's degree or higher.

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
637	-	-	-	-	-	-	**Operators, fabricators, and laborers**
146	-	-	-	-	-	-	Machine setters, set-up operators, operators, and tenders
4	VL	27,110	H	H	VL	Moderate-term on-the-job	Numerical control machine tool operators and tenders, metal and plastic[1]
4	VL	23,860	H	H	VL	Moderate-term on-the-job	Combination machine tool setters, set-up operators, operators, and tenders, metal and plastic[1]
19	-	-	-	-	-	-	Machine tool cut and form setters, operators, and tenders, metal and plastic
1	VL	25,630	H	H	VL	Moderate-term on-the-job	Drilling and boring machine tool setters and set-up operators, metal and plastic[1]
2	VL	24,740	H	H	VL	Moderate-term on-the-job	Grinding, lapping, and buffing machine tool setters and set-up operators, metal and plastic
2	VL	28,250	H	H	VL	Moderate-term on-the-job	Lathe and turning machine tool setters and set-up operators, metal and plastic[1]
4	VL	20,170	L	H	VL	Moderate-term on-the-job	Machine forming operators and tenders, metal and plastic
3	VL	24,510	H	H	VL	Moderate-term on-the-job	Machine tool cutting operators and tenders, metal and plastic
1	VL	23,270	L	VH	VL	Moderate-term on-the-job	Punching machine setters and set-up operators, metal and plastic
7	VL	25,020	H	H	VL	Moderate-term on-the-job	All other machine tool setters, set-up operators, metal and plastic[1]
5	-	-	-	-	-	-	Metal fabricating machine setters, operators, and related workers
1	VL	24,070	H	H	VL	Moderate-term on-the-job	Metal fabricators, structural metal products[1]
0	VL	20,950	L	VH	L	Moderate-term on-the-job	Soldering and brazing machine operators and tenders[1]
3	VL	25,010	H	H	VL	Moderate-term on-the-job	Welding machine setters, operators, and tenders
17	-	-	-	-	-	-	Metal and plastic processing machine setters, operators, and related workers
2	VL	21,210	L	VH	VL	Moderate-term on-the-job	Electrolytic plating machine setters, set-up operators, operators, and tenders, metal and plastic[1]
0	VL	21,910	L	H	VL	Moderate-term on-the-job	Foundry mold assembly and shake out workers
0	VL	25,870	H	H	VL	Moderate-term on-the-job	Furnace operators and tenders[1]
1	VL	25,160	H	VH	VL	Moderate-term on-the-job	Heat treating, annealing, and tempering machine operators and tenders, metal and plastic[1]
2	VL	24,870	H	H	VL	Moderate-term on-the-job	Metal molding machine setters, set-up operators, operators, and tenders
7	VL	18,580	L	H	VL	Moderate-term on-the-job	Plastic molding machine setters, set-up operators, operators, and tenders
5	VL	22,780	L	VH	VL	Moderate-term on-the-job	All other metal and plastic machine setters, operators, and related workers[1]
11	-	-	-	-	-	-	Printing, binding, and related workers
3	VL	20,610	L	L	L	Moderate-term on-the-job	Bindery machine operators and set-up operators[1]
0	-	-	-	-	-	-	Prepress printing workers, production
0	VL	23,960	H	L	L	Moderate-term on-the-job	Photoengraving and lithographic machine operators and tenders[1]
0	VL	23,050	L	L	L	Moderate-term on-the-job	Typesetting and composing machine operators and tenders[1]
6	-	-	-	-	-	-	Printing press operators
0	VL	28,620	H	L	VL	Moderate-term on-the-job	Letterpress operators
1	VL	31,000	H	L	VL	Moderate-term on-the-job	Offset lithographic press operators
4	VL	26,030	H	L	VL	Moderate-term on-the-job	Printing press machine setters, operators and tenders
0	VL	27,720	H	L	L	Moderate-term on-the-job	All other printing press setters and set-up operators
1	VL	18,880	L	L	L	Moderate-term on-the-job	Screen printing machine setters and set-up operators
1	VL	22,950	L	L	L	Moderate-term on-the-job	All other printing, binding, and related workers[1]
13	-	-	-	-	-	-	Textile and related setters, operators, and related workers
1	VL	27,940	H	VH	L	Moderate-term on-the-job	Extruding and forming machine operators and tenders, synthetic or glass fibers[1]
1	VL	15,150	VL	VH	VH	Moderate-term on-the-job	Pressing machine operators and tenders, textile, garment, and related materials
5	VL	14,740	VL	VH	L	Moderate-term on-the-job	Sewing machine operators, garment

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Sewing machine operators, non-garment	137	140	3	VL	2.5	VL	3.8	19	VL
Textile bleaching and dyeing machine operators and tenders[1]	24	22	-2	VL	-9.0	VL	3.2	4	VL
Textile draw-out and winding machine operators and tenders[1]	192	141	-50	VL	-26.3	VL	.9	23	VL
Textile machine setters and set-up operators	28	26	-3	VL	-9.6	VL	.0	4	VL
Woodworking machine setters, operators, and other related workers	143	130	-14	-	-9.4	-	5.6	45	-
Head sawyers and sawing machine operators and tenders, setters and set-up operators	64	61	-4	VL	-5.7	VL	2.0	24	VL
Woodworking machine operators and tenders, setters and set-up operators[1]	79	69	-10	VL	-12.5	VL	8.5	21	VL
Other machine setters, set-up operators, operators, and tenders	2,172	2,377	205	-	9.4	-	2.3	396	-
Boiler operators and tenders, low pressure	16	14	-2	VL	-11.0	VL	.0	1	VL
Cement and gluing machine operators and tenders[1]	32	27	-5	VL	-15.6	VL	.0	5	VL
Chemical equipment controllers, operators and tenders[1]	100	111	11	VL	11.4	L	.0	20	VL
Cooking and roasting machine operators and tenders, food and tobacco[1]	31	28	-3	VL	-8.5	VL	1.6	4	VL
Crushing, grinding, mixing, and blending machine operators and tenders	150	154	4	VL	2.8	VL	1.6	27	VL
Cutting and slicing machine setters, operators and tenders	96	102	6	VL	6.4	VL	2.5	18	VL
Dairy processing equipment operators, including setters[1]	15	12	-3	VL	-20.4	VL	6.8	2	VL
Electronic semiconductor processors	63	92	29	L	45.2	VH	.0	11	VL
Extruding and forming machine setters, operators and tenders[1]	126	132	6	VL	5.0	VL	.0	23	VL
Furnace, kiln, oven, drier, or kettle operators and tenders[1]	25	24	-1	VL	-5.6	VL	.0	2	VL
Laundry and dry-cleaning machine operators and tenders, except pressing	167	184	16	VL	9.8	L	14.7	38	VL
Motion picture projectionists[1]	9	7	-2	VL	-21.8	VL	6.4	1	VL
Packaging and filling machine operators and tenders	377	425	49	L	12.9	L	.0	88	L
Painting and coating machine operators	171	186	15	-	8.7	-	5.5	35	-
Coating, painting, and spraying machine operators, tenders, setters, and set-up operators	129	140	11	VL	8.7	L	2.3	26	VL
Painters, transportation equipment	42	46	4	VL	9.0	L	15.4	9	VL
Paper goods machine setters and set-up operators[1]	62	59	-3	VL	-4.1	VL	.0	9	VL
Photographic processing machine operators and tenders	46	41	-5	VL	-11.4	VL	.0	10	VL
Separating, filtering, clarifying, precipitating, and still machine operators and tenders[1]	28	26	-2	VL	-7.2	VL	.0	5	VL
Shoe sewing machine operators and tenders[1]	7	4	-2	VL	-35.8	VL	.0	1	VL
Tire building machine operators	18	17	0	VL	-1.4	VL	.0	2	VL
All other machine operators, tenders, setters, and set-up operators[1]	635	732	97	L	15.2	H	1.4	92	L
Hand workers, including assemblers and fabricators	3,092	3,382	290	-	9.3	-	3.6	636	-
Cannery workers	50	44	-6	VL	-12.0	VL	.0	10	VL
Coil winders, tapers, and finishers	22	22	1	VL	2.5	VL	.0	5	VL
Cutters and trimmers, hand[1]	42	39	-4	VL	-8.3	VL	1.2	7	VL
Electrical and electronic assemblers	246	265	19	VL	7.7	VL	.0	59	L
Grinders and polishers, hand	81	84	3	VL	4.3	VL	.0	13	VL
Machine assemblers	67	71	4	VL	5.5	VL	.0	16	VL
Meat, poultry, and fish cutters and trimmers, hand[1]	143	178	35	L	24.2	VH	.0	33	VL
Painting, coating, and decorating workers, hand[1]	39	46	7	VL	17.7	H	18.4	9	VL
Pressers, hand	13	12	-2	VL	-11.4	VL	.0	2	VL
Sewers, hand	10	8	-1	VL	-14.8	VL	.0	1	VL
Solderers and brazers[1]	35	40	5	VL	14.4	H	.0	8	VL
Welders and cutters	368	398	31	L	8.3	L	5.2	38	VL
All other assemblers, fabricators, and hand workers[1]	1,976	2,175	198	H	10.0	L	4.2	437	VH

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
2	VL	16,990	L	VH	H	Moderate-term on-the-job	Sewing machine operators, non-garment
0	VL	19,350	L	VH	L	Moderate-term on-the-job	Textile bleaching and dyeing machine operators and tenders[1]
3	VL	19,480	L	VH	H	Moderate-term on-the-job	Textile draw-out and winding machine operators and tenders[1]
0	VL	21,620	L	VH	H	Moderate-term on-the-job	Textile machine setters and set-up operators
4	-	-	-	-	-	-	Woodworking machine setters, operators, and other related workers
2	VL	19,490	L	VH	L	Moderate-term on-the-job	Head sawyers and sawing machine operators and tenders, setters and set-up operators
2	VL	19,260	L	VH	L	Moderate-term on-the-job	Woodworking machine operators and tenders, setters and set-up operators[1]
69	-	-	-	-	-	-	Other machine setters, set-up operators, operators, and tenders
0	VL	30,320	H	VL	VL	Moderate-term on-the-job	Boiler operators and tenders, low pressure
1	VL	20,720	L	H	L	Moderate-term on-the-job	Cement and gluing machine operators and tenders[1]
4	VL	32,180	H	VL	VL	Moderate-term on-the-job	Chemical equipment controllers, operators and tenders[1]
1	VL	21,710	L	H	VL	Moderate-term on-the-job	Cooking and roasting machine operators and tenders, food and tobacco[1]
4	VL	23,350	L	H	L	Moderate-term on-the-job	Crushing, grinding, mixing, and blending machine operators and tenders
3	VL	21,680	L	H	L	Moderate-term on-the-job	Cutting and slicing machine setters, operators and tenders
0	VL	25,800	H	VL	VL	Moderate-term on-the-job	Dairy processing equipment operators, including setters[1]
4	VL	24,810	H	H	VL	Moderate-term on-the-job	Electronic semiconductor processors
4	VL	23,180	L	H	L	Moderate-term on-the-job	Extruding and forming machine setters, operators and tenders[1]
0	VL	25,110	H	H	VL	Moderate-term on-the-job	Furnace, kiln, oven, drier, or kettle operators and tenders[1]
6	VL	14,670	VL	VH	VH	Moderate-term on-the-job	Laundry and dry-cleaning machine operators and tenders, except pressing
0	VL	15,420	VL	H	L	Short-term on-the-job	Motion picture projectionists[1]
15	L	20,060	L	VH	L	Moderate-term on-the-job	Packaging and filling machine operators and tenders
5	-	-	-	-	-	-	Painting and coating machine operators
4	VL	21,820	L	VH	VL	Moderate-term on-the-job	Coating, painting, and spraying machine operators, tenders, setters, and set-up operators
1	VL	29,120	H	VH	VL	Moderate-term on-the-job	Painters, transportation equipment
1	VL	25,990	H	H	VL	Moderate-term on-the-job	Paper goods machine setters and set-up operators[1]
2	VL	17,810	L	H	VH	Short-term on-the-job	Photographic processing machine operators and tenders
1	VL	29,600	H	VL	VL	Moderate-term on-the-job	Separating, filtering, clarifying, precipitating, and still machine operators and tenders[1]
0	VL	16,230	VL	VH	VL	Moderate-term on-the-job	Shoe sewing machine operators and tenders[1]
0	VL	36,430	VH	H	VL	Moderate-term on-the-job	Tire building machine operators
19	L	22,170	L	H	VL	Moderate-term on-the-job	All other machine operators, tenders, setters, and set-up operators[1]
97	-	-	-	-	-	-	Hand workers, including assemblers and fabricators
1	VL	15,720	VL	VH	L	Short-term on-the-job	Cannery workers
0	VL	18,660	L	VH	L	Short-term on-the-job	Coil winders, tapers, and finishers
1	VL	17,130	L	VH	L	Short-term on-the-job	Cutters and trimmers, hand[1]
6	VL	18,800	L	VH	L	Short-term on-the-job	Electrical and electronic assemblers
3	VL	20,450	L	VH	L	Short-term on-the-job	Grinders and polishers, hand
2	VL	22,640	L	VH	L	Short-term on-the-job	Machine assemblers
7	VL	16,270	VL	VH	L	Short-term on-the-job	Meat, poultry, and fish cutters and trimmers, hand[1]
2	VL	19,060	L	VH	L	Short-term on-the-job	Painting, coating, and decorating workers, hand[1]
0	VL	14,750	VL	VH	L	Short-term on-the-job	Pressers, hand
0	VL	15,520	VL	H	VH	Short-term on-the-job	Sewers, hand
1	VL	17,610	L	VH	L	Short-term on-the-job	Solderers and brazers[1]
12	L	25,810	H	H	VL	Long-term on-the-job	Welders and cutters
61	H	18,770	L	VH	L	Short-term on-the-job	All other assemblers, fabricators, and hand workers[1]

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[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

1998 Matrix Occupation	Employment		Employment change, 1998-2008				Percent self-employed, 1998	Annual average job openings due to growth and total replacement needs, 1998-2008	
			Numeric		Percent				
	1998	2008	Number	Rank	Number	Rank		Number	Rank
Transportation and material moving machine and vehicle operators	5,215	5,960	745	-	14.2	-	6.8	866	-
Motor vehicle operators	4,084	4,723	639	-	15.6	-	8.1	685	-
Bus drivers	638	747	108	-	1.0	-	1.1	95	-
Bus drivers, transit and intercity	203	235	32	L	15.8	H	3.3	30	VL
Bus drivers, school	435	511	76	L	17.6	H	.0	65	L
Taxi drivers and chauffeurs	132	158	26	L	20.0	VH	34.4	27	VL
Truck drivers	3,274	3,782	507	-	15.4	-	8.6	557	-
Driver/sales workers	305	319	14	VL	4.7	VL	4.5	23	VL
Truck drivers light and heavy	2,970	3,463	493	VH	16.6	H	9.0	535	VH
All other motor vehicle operators[1]	40	37	-3	VL	-8.5	VL	.0	6	VL
Rail transportation workers	85	75	-10	-	-11.0	-	.0	5	-
Locomotive engineers[1]	33	35	2	VL	4.8	VL	.0	2	VL
Railroad brake, signal, and switch operators[1]	14	7	-7	VL	-47.8	VL	.0	1	VL
Railroad conductors and yardmasters[1]	25	24	-2	VL	-6.7	VL	.0	2	VL
Subway and streetcar operators[1]	3	4	0	VL	7.1	VL	.0	0	VL
All other rail transportation workers[1]	8	5	-3	VL	-35.6	VL	.0	0	VL
Water transportation and related workers	56	58	3	-	4.7	-	5.5	11	-
Able seamen, ordinary seamen, and marine oilers[1]	23	24	1	VL	5.1	VL	.6	4	VL
Captains and pilots, water vessels[1]	19	19	1	VL	3.0	VL	15.7	4	VL
Mates, ship, boat, and barge[1]	8	9	1	VL	7.9	VL	.0	2	VL
Ship engineers[1]	6	7	0	VL	4.3	VL	.0	1	VL
Material moving equipment operators	808	883	74	-	9.0	-	2.2	131	-
Crane and tower operators	49	49	0	VL	.5	VL	.0	6	VL
Excavation and loading machine operators[1]	106	122	16	VL	15.3	H	14.4	6	VL
Hoist and winch operators[1]	11	11	1	VL	6.0	VL	6.1	2	VL
Industrial truck and tractor operators	415	454	38	L	9.2	L	.2	81	L
All other material moving equipment operators	228	247	19	VL	8.3	L	.4	36	VL
All other transportation and material moving equipment operators[1]	183	222	39	L	21.5	VH	.0	35	VL
Helpers, laborers, and material movers, hand	5,142	5,768	626	-	12.1	-	1.4	1,636	-
Cleaners of vehicles and equipment	288	360	72	L	25.0	VH	8.2	117	L
Freight, stock, and material movers, hand[1]	822	834	12	VL	1.5	VL	1.7	307	H
Hand packers and packagers	984	1,197	213	H	21.7	VH	.8	249	H
Helpers, construction trades	576	618	42	L	7.3	VL	.4	167	L
Machine feeders and offbearers	213	211	-2	VL	-.9	VL	.0	40	VL
Parking lot attendants[1]	86	113	27	L	31.2	VH	.0	18	VL
Refuse and recyclable material collectors[1]	99	103	4	VL	3.9	VL	1.7	39	VL
Service station attendants	141	139	-2	VL	-1.2	VL	3.0	40	VL
All other helpers, laborers, and material movers, hand[1]	1,934	2,194	260	H	13.4	L	.9	654	VH

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[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

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Table 2. Occupational employment and job openings data, 1998-2008, and worker characteristics, 1998 — Continued

(Numbers in thousands)

Annual average job openings due to growth and net replacement needs, 1998-2008		Median annual earnings		Ranking of:		Most significant source of education or training	1998 Matrix Occupation
Number	Rank	Dollars	Rank	Unemployment rate	Percent part-time		
							Transportation and material moving machine and vehicle operators
161	-	-	-	-	-	-	
127	-	-	-	-	-	-	Motor vehicle operators
22	-	-	-	-	-	-	Bus drivers
7	VL	24,380	H	L	VH	Moderate-term on-the-job	Bus drivers, transit and intercity
15	L	18,820	L	L	VH	Short-term on-the-job	Bus drivers, school
5	VL	15,550	VL	H	H	Short-term on-the-job	Taxi drivers and chauffeurs
99	-	-	-	-	-	-	Truck drivers
7	VL	19,330	L	VL	L	Short-term on-the-job	Driver/sales workers
92	VH	24,260	H	H	L	Short-term on-the-job	Truck drivers light and heavy
1	VL	18,330	L	H	H	Short-term on-the-job	All other motor vehicle operators[1]
3	-	-	-	-	-	-	Rail transportation workers
1	VL	39,800	VH	VL	VL	Related work experience	Locomotive engineers[1]
0	VL	36,550	VH	VL	VL	Related work experience	Railroad brake, signal, and switch operators[1]
1	VL	38,500	VH	VL	VL	Related work experience	Railroad conductors and yardmasters[1]
0	VL	43,330	VH	VL	VL	Moderate-term on-the-job	Subway and streetcar operators[1]
0	VL	35,600	VH	VL	VL	Moderate-term on-the-job	All other rail transportation workers[1]
2	-	-	-	-	-	-	Water transportation and related workers
1	VL	23,700	H	L	VL	Short-term on-the-job	Able seamen, ordinary seamen, and marine oilers[1]
1	VL	41,210	VH	L	VL	Related work experience	Captains and pilots, water vessels[1]
0	VL	29,310	H	L	VL	Related work experience	Mates, ship, boat, and barge[1]
0	VL	40,150	VH	L	VL	Related work experience	Ship engineers[1]
21	-	-	-	-	-	-	Material moving equipment operators
1	VL	30,510	H	H	VL	Moderate-term on-the-job	Crane and tower operators
4	VL	27,090	H	H	VL	Moderate-term on-the-job	Excavation and loading machine operators[1]
0	VL	28,030	H	VH	VL	Moderate-term on-the-job	Hoist and winch operators[1]
9	VL	23,360	L	H	VL	Short-term on-the-job	Industrial truck and tractor operators
7	VL	23,970	H	VH	L	Moderate-term on-the-job	All other material moving equipment operators
7	VL	24,120	H	H	H	Moderate-term on-the-job	All other transportation and material moving equipment operators[1]
234	-	-	-	-	-	-	Helpers, laborers, and material movers, hand
16	L	14,540	VL	VH	VH	Short-term on-the-job	Cleaners of vehicles and equipment
31	L	18,460	L	VH	VH	Short-term on-the-job	Freight, stock, and material movers, hand[1]
46	H	14,550	VL	VH	H	Short-term on-the-job	Hand packers and packagers
31	L	19,510	L	VH	H	Short-term on-the-job	Helpers, construction trades
6	VL	18,810	L	VH	H	Short-term on-the-job	Machine feeders and offbearers
4	VL	13,920	VL	H	H	Short-term on-the-job	Parking lot attendants[1]
4	VL	21,860	L	VH	H	Short-term on-the-job	Refuse and recyclable material collectors[1]
6	VL	14,350	VL	VH	VH	Short-term on-the-job	Service station attendants
89	VH	17,920	L	VH	H	Short-term on-the-job	All other helpers, laborers, and material movers, hand[1]

[1] One or more Current Population Survey (CPS) proxy occupations are used to estimate CPS based data.

[2] Current Population Survey data are used to estimate median weekly earnings ranking.

[3] Bachelor's degree or higher.

NOTE: Rankings are based on employment in all detailed occupations in the National Industry-Occupation Matrix. For details, see "Data presented" section of text. Codes for describing the ranked variables are: VH = Very high, H = High, L = Low, VL = Very low, n. a. = Data not available. A dash indicates data are not applicable.

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The rating for the part-time category also should not be used routinely in assessing the desirability of employment because the assessment depends on the perspective of the user. For example, high school students may consider a large proportion of part-time work desirable because they normally prefer not to work full time. A recent college graduate or anyone seeking full-time employment may reach the opposite conclusion.

The data in table 2 have many potential uses. At times, users may want to know how a particular occupation—cashiers, for example—compares with others. The "VH" (very high) rankings in table 2 for the increase in the number of jobs and for both categories of job openings point out that many jobs are available, certainly a favorable rating. The "VL" (very low) ranking for earnings and "VH" (very high) for unemployment, however, are unfavorable in comparison with other occupations, and these characteristics detract from the desirability of employment in the occupation. Table 2 also shows that cashiers require only short-term on-the-job training.

Some readers might wish to identify occupations with favorable characteristics that jobseekers can pursue through a specific type of training. For example, a student might be interested in a technical occupation, but does not care to obtain a 4-year college degree. In another instance, a planner might wish to ensure that training programs provided by junior colleges in the area are consistent with the needs of the national labor market. To obtain appropriate information, both the student and the planner could examine information for occupations placed in the associate degree educational or training category.

Although table 2 contains a great deal of information useful for career guidance, information about occupational comparisons should be used as an aid, not a sole source of information for making career choices. After using the table to identify occupations with favorable prospects, additional information should be obtained from other sources such as the *Occupational Outlook Handbook*, the *Occupational Outlook Quarterly*, and local sources, if available. Consideration should be given to individual aptitudes and preferences, and alternative sources of training available in the local area should be investigated. The appendix identifies sources of State and local area information.

An electronic version of table 2 is available on the Internet at **ftp://146.142.4.23/pub/special.requests/ep/OPTDData/**.

Chapter III. Factors Affecting Occupational Employment, 1998–2008

Occupational employment may change over time for several reasons. An occupation's employment could increase because of growing demand for goods and services produced by industries in which the employment is concentrated, for example. In addition, increases in an occupation's utilization in many industries could boost its employment in those industries. This chapter presents information about both categories of factors—those affecting industry employment, and those affecting occupational utilization within industries—that drive changes in occupational employment.

Industry employment

Many assumptions underlie the BLS projections of the aggregate economy and of industry output, productivity, and employment. Often, these assumptions bear specifically on macroeconomic factors, such as the aggregate unemployment rate, the expected time path of labor productivity, and expectations regarding the Federal budget surplus or deficit. Other assumptions use factors that affect industry-specific measures of economic activity.

Detailed industry employment projections are based largely on time series models, which, by their very nature, project future economic behavior based on a continuation of economic relationships that held in the past. For the most part, the determinants of industry employment are expressed in the structure of the model equations, and as adjustments imposed on the specific equations to ensure that the models are indeed making a smooth transition from actual historical data to projected future results. However, one of the most important steps associated with the preparation the BLS projections is a detailed review of the results by analysts who studied recent economic trends in specific industries. In some cases, the results of the aggregate and industry models were modified because of the analysts' judgment that historical relationships needed to be modified in some manner. Table 3 presents historical and projected information about employment and output for detailed industries. Specific factors that underlie the determination of projected industry employment are presented in table 4 to allow the user of the projections to better understand the rationale for projected changes in industry employment and output.

Occupation utilization

BLS projections of wage and salary employment are developed within the framework of an industry-occupation matrix, which shows the occupational distribution in an industry. Historical data show that the occupational distribution of industries changes over time as the utilization of some occupations changes relative to that of other occupations.

Several factors may affect the changes in the utilization of workers in an occupation in particular industries, including changes in technology, changes in business practices, changes in the mix of goods and services produced by industries, and changes in the size of business establishments in industries. Bureau staff analyzes each occupation in the matrix to identify the factors likely to affect an increase or decrease in the occupation's utilization in the future. The analyses incorporate judgments about new trends that may have not been influential in the past, such as the use of the Internet or e-commerce. Table 5 contains brief descriptions of the factors underlying projected changes in occupation utilization within industries between 1998 and 2008. Occupations appear in alphabetical order. Although all detailed occupations were analyzed, utilization for many occupations was projected not to change. These occupations are not included in table 5. Additionally, factors are discussed for only the most significant industries—those that have the highest share of an occupation's employment.

In developing the projections, BLS staff made hundreds of analytical decisions of this nature. To maintain consistency among analysts, guidelines for changing distributions were established as follows: small change = ± 10 percent; moderate change = ± 20 percent; large change = ± 35 percent; and very large change = ± 50 percent.

Table 3. Employment and output by industry, 1988, 1998, and projected 2008

(Numbers in thousands)

Industry title and Standard Industrial Classification code	Employment							Output[1]				
	Thousands of jobs			Change		Average annual rate of growth (percent)		Billions on chained (1992) dollars			Average annual rate of growth (percent)	
	1988	1998	2008	1988-1998	1998-2008	1988-1998	1998-2008	1988	1998	2008	1988-1998	1998-2008
Nonfarm wage and salary[2]	104,570	124,887	144,526	20316	19,640	1.8	1.5	9,558	12,420	17,145	2.7	3.3
Mining (10-14)	713	590	475	-123	-115	-1.9	-2.1	183	175	197	-.4	1.2
Metal mining (10)	50	50	37	1	-13	.1	-3.0	9	11	15	2.3	3.7
Coal mining (12)	151	92	59	-59	-32	-4.9	-4.2	26	29	31	1.2	.7
Crude petroleum, natural gas, and gas liquids (131, 132)	201	143	77	-58	-66	-3.4	-6.0	117	99	109	-1.6	.9
Oil and gas field services... (138)	199	196	205	-3	9	-.2	.5	18	19	21	.7	1.2
Nonmetallic minerals, except fuels (14)	112	109	96	-3	-13	-.3	-1.2	15	17	20	1.3	1.5
Construction (15, 16, 17)	5,098	5,985	6,535	887	550	1.6	.9	661	697	792	.5	1.3
Manufacturing (20-39)	19,314	18,772	18,684	-542	-89	-.3	.0	2,904	3,861	5,650	2.9	3.9
Durable manufacturing (24, 25, 32-39)	11,363	11,170	11,277	-193	107	-.2	.1	1,506	2,241	3,813	4.1	5.5
Lumber and wood products (24)	767	813	811	46	-2	.6	.0	93	100	104	.7	.4
Logging (241)	88	79	82	-9	2	-1.0	.3	22	18	20	-2.1	1.2
Sawmills and planing mills (242)	204	183	162	-21	-21	-1.1	-1.2	24	27	25	1.1	-.7
Millwork, plywood, and structural members (243)	273	308	315	34	7	1.2	.2	28	30	30	.7	-.1
Wood containers and miscellaneous wood products (244, 249)	134	144	147	10	4	.7	.3	13	16	18	2.2	1.3
Wood buildings and mobile homes (245)	68	99	105	31	6	3.8	.6	7	10	11	3.4	1.4
Furniture and fixtures (25)	527	530	546	4	15	.1	.3	46	63	71	3.3	1.2
Household furniture (251)	308	283	266	-25	-16	-.8	-.6	22	29	28	2.7	-.4
Partitions and fixtures (254)	79	93	109	13	16	1.6	1.6	7	9	11	2.7	2.6
Office and miscellaneous furniture and fixtures (252, 253, 259)	140	155	170	15	15	1.0	.9	17	25	32	4.2	2.3
Glass and glass products (321-323)	157	151	140	-6	-11	-.4	-.8	18	22	26	2.1	1.7
Hydraulic cement (324)	20	17	14	-2	-4	-1.1	-2.3	4	5	4	.9	-1.2
Stone, clay and miscellaneous mineral products (325, 326, 328, 329)	176	166	147	-11	-18	-.6	-1.2	19	20	22	.6	.8
Concrete, gypsum, and plaster products (327)	214	229	230	15	1	.7	.0	26	29	33	1.3	1.1
Primary metal industries (33)	770	712	643	-59	-69	-.8	-1.0	144	161	216	1.1	3.0
Blast furnaces and basic steel products (331)	278	232	177	-47	-55	-1.8	-2.7	64	69	91	.8	2.7
Iron and steel foundries (332)	136	131	134	-5	3	-.4	.2	13	15	21	1.4	3.4
Primary nonferrous smelting and refining (333)	44	39	32	-5	-8	-1.2	-2.1	12	12	15	-.3	2.1
All other primary metals (334, 339)	45	47	46	3	-2	.6	-.4	9	11	17	2.4	3.9
Nonferrous rolling and drawing (335)	179	170	157	-9	-13	-.5	-.8	39	44	60	1.1	3.2
Nonferrous foundries (336)	88	93	98	5	6	.5	.6	8	10	14	3.1	2.8
Fabricated metal products (34)	1,428	1,501	1,519	72	18	.5	.1	172	217	260	2.4	1.8
Metal cans and shipping containers (341)	53	37	25	-16	-12	-3.6	-3.8	13	14	16	.7	.8
Cutlery, handtools and hardware (342)	139	126	108	-13	-18	-.9	-1.5	16	20	23	2.4	1.3
Plumbing and nonelectric heating equipment (343)	62	58	57	-5	-1	-.8	-.1	7	8	8	1.1	.1
Fabricated structural metal products (344)	423	464	500	41	36	.9	.8	46	56	60	2.1	.7
Screw machine products, bolts, rivets, etc (345)	99	107	105	7	-2	.7	-.2	10	14	14	3.5	.6
Metal forgings and stampings (346)	227	257	250	30	-7	1.2	-.3	32	44	51	3.1	1.4
Metal coating, engraving and allied services (347)	119	144	165	25	21	1.9	1.3	10	16	27	4.8	5.3
Ordinance and ammunition (348)	77	41	34	-36	-7	-6.1	-1.8	9	5	6	-6.3	2.9
Miscellaneous fabricated metal products (349)	230	268	275	38	7	1.6	.3	30	41	55	3.2	3.1
Industrial machinery and equipment (35)	2,089	2,203	2,197	114	-6	.5	.0	238	574	1,541	9.2	10.4
Engines and turbines (351)	92	84	69	-9	-15	-1.0	-1.9	19	24	29	2.2	1.8
Farm and garden machinery (352)	102	104	95	2	-9	.2	-.9	15	22	28	3.9	2.5
Construction and related machinery (353)	222	253	270	31	17	1.3	.6	30	41	52	3.2	2.5
Metal working machinery and equipment (354)	327	352	324	25	-28	.7	-.8	26	33	40	2.4	2.0
Special industry machinery (355)	159	179	187	20	8	1.2	.4	21	33	51	4.8	4.3
General industrial machinery and equipment (356)	232	269	273	37	4	1.5	.1	30	38	53	2.5	3.4
Computer and office equipment (357)	459	379	369	-80	-11	-1.9	-.3	50	446	1,723	24.6	14.5
Refrigeration and service industry machinery (358)	186	200	216	14	16	.7	.8	28	40	49	3.3	2.1
Industrial machinery, nec (359)	309	382	393	73	11	2.2	.3	24	41	58	5.7	3.6
Electronic and other electronic equipment (36)	1,764	1,704	1,773	-60	69	-.3	.4	193	401	870	7.6	8.1
Electric distribution equipment (361)	101	82	70	-18	-13	-2.0	-1.7	11	13	17	1.5	2.7
Electrical industrial apparatus (362)	178	153	122	-25	-31	-1.5	-2.3	19	27	37	3.6	3.2
Household appliances (363)	137	117	96	-21	-20	-1.6	-1.9	17	19	21	1.6	.8
Electric lighting and wiring equipment (364)	198	183	157	-15	-26	-.8	-1.5	21	24	28	1.2	1.6

See footnotes at end of table.

Table 3. Employment and output by industry, 1988, 1998, and projected 2008 — Continued

(Numbers in thousands)

Industry title and Standard Industrial Classification code	Employment							Output[1]				
	Thousands of jobs			Change		Average annual rate of growth (percent)		Billions on chained (1992) dollars			Average annual rate of growth (percent)	
	1988	1998	2008	1988-1998	1998-2008	1988-1998	1998-2008	1988	1998	2008	1988-1998	1998-2008
Household audio and video equipment (365)	84	82	67	-2	-14	-.2	-1.9	9	16	20	6.3	2.4
Communication equipment (366)	275	282	302	7	21	.3	.7	36	78	169	7.6	8.1
Electronic components and accessories (367)	622	660	820	38	160	.6	2.2	55	203	571	13.9	10.9
Miscellaneous electrical equipment (369)	170	146	139	-24	-7	-1.5	-.5	25	27	31	1.0	1.3
Transportation equipment (37)	2,036	1,884	1,988	-152	104	-.8	.5	392	481	604	2.1	2.3
Motor vehicles and equipment (371)	856	990	940	133	-50	1.5	-.5	238	324	375	3.2	1.5
Aerospace (372, 376)	892	615	750	-276	135	-3.6	2.0	126	120	179	-.5	4.1
Ship and boat building and repairing (373)	196	166	160	-30	-6	-1.6	-.4	17	16	18	-.7	1.0
Railroad equipment (374)	31	37	42	6	5	1.8	1.3	4	8	10	6.8	3.1
Miscellaneous transportation equipment (375, 379)	62	76	96	14	20	2.1	2.3	7	13	21	6.2	5.2
Instruments and related products (38)	1,031	868	887	-164	20	-1.7	.2	123	154	222	2.2	3.7
Search and navigation equipment (381)	316	162	143	-155	-19	-6.5	-1.2	41	33	41	-2.1	2.1
Measuring and controlling devices (382)	324	304	300	-20	-4	-.6	-.1	31	45	73	3.9	4.8
Medical equipment, instruments, and supplies (384)	231	279	335	48	56	1.9	1.8	28	51	80	6.3	4.5
Ophthalmic goods (385)	39	35	36	-4	1	-1.1	.3	2	3	5	5.6	5.1
Photographic equipment and supplies (386)	109	81	69	-28	-12	-2.9	-1.6	21	20	24	-.1	1.6
Watches, clocks and parts (387)	12	7	5	-5	-2	-5.4	-3.7	2	1	-	-3.2	11.7
Miscellaneous manufacturing industries (39)	383	393	383	10	-10	.3	-.3	38	50	61	2.8	2.0
Jewelry, silverware, and plated ware (391)	53	50	42	-3	-8	-.6	-1.8	6	8	8	1.9	-
Toys and sporting goods (394)	103	106	95	2	-11	.2	-1.1	11	15	17	3.3	1.6
Manufactured products, nec (393, 395, 396, 3999)	226	237	246	11	9	.5	.4	21	28	36	2.8	2.7
Nondurable manufacturing (20-23, 26-31)	7,951	7,602	7,406	-349	-196	-.4	-.3	1,398	1,629	1,909	1.5	1.6
Food and kindred products (20)	1,626	1,686	1,721	60	36	.4	.2	373	441	496	1.7	1.2
Meat products (201)	399	494	570	95	76	2.2	1.4	84	102	121	2.0	1.7
Dairy products (202)	158	140	124	-18	-16	-1.2	-1.2	50	54	57	.7	.6
Preserved fruits and vegetables (203)	236	229	217	-7	-13	-.3	-.6	42	49	54	1.5	.9
Grain mill products, fats and oils (204, 207)	156	158	159	3	1	.2	.1	54	61	71	1.2	1.5
Bakery products (205)	212	206	197	-5	-10	-.3	-.5	27	29	29	.8	-.1
Sugar and confectionery products (206)	100	97	93	-3	-4	-.3	-.4	21	26	28	2.0	.6
Beverages (208)	199	182	165	-17	-18	-.9	-1.0	63	80	93	2.4	1.5
Miscellaneous foods and kindred products (209)	166	178	197	11	19	.7	1.0	32	41	45	2.6	.9
Tobacco products (21)	54	41	30	-14	-11	-2.9	-3.1	41	41	45	.1	1.0
Textile mill products (22)	728	598	501	-130	-97	-1.9	-1.7	68	85	95	2.2	1.2
Weaving, finishing, yarn and thread mills (221-224, 226, 228)	400	320	251	-80	-69	-2.2	-2.4	36	40	42	1.2	.4
Knitting mills (225)	215	159	128	-55	-32	-2.9	-2.2	14	21	26	4.4	2.1
Carpets and rugs (227)	61	64	74	3	10	.5	1.4	12	14	17	1.5	2.0
Miscellaneous textile goods (229)	53	55	49	2	-6	.4	-1.1	7	10	12	3.2	1.4
Apparel and other textile products (23)	1,085	763	586	-322	-178	-3.5	-2.6	67	76	78	1.2	.3
Apparel (231-238)	888	547	350	-341	-197	-4.7	-4.4	52	55	52	.6	-.6
Miscellaneous fabricated textile products (239)	197	216	236	19	20	.9	.9	16	21	26	2.8	2.2
Paper and allied products (26)	689	675	674	-14	-	-.2	.0	128	145	172	1.3	1.7
Pulp, paper, and paperboard mills (261-263)	244	215	187	-29	-28	-1.3	-1.4	54	55	64	.3	1.4
Paperboard containers and boxes (265)	206	219	236	13	17	.6	.7	29	36	44	1.9	2.1
Converted paper products except containers (267)	239	241	252	2	11	.1	.4	44	55	64	2.1	1.6
Printing and publishing (27)	1,543	1,566	1,545	22	-20	.1	-.1	169	181	196	.7	.8
Newspapers (271)	473	443	401	-30	-42	-.7	-1.0	42	32	26	-2.7	-1.4
Periodicals (272)	127	138	150	12	12	.9	.8	23	25	27	.7	.7
Books (273)	115	127	139	12	12	1.0	.9	21	24	28	1.5	1.7
Miscellaneous publishing (274)	79	91	97	13	6	1.5	.7	10	12	16	2.5	2.6
Commercial printing and business forms (275, 276)	589	623	624	34	1	.6	.0	61	72	83	1.7	1.5
Greeting cards (277)	24	29	32	5	3	1.9	.9	3	4	4	3.1	.1
Blankbooks and bookbinding (278)	75	64	62	-11	-2	-1.6	-.3	5	6	5	2.6	-1.9
Service industries for the printing trade (279)	62	50	41	-12	-9	-2.1	-2.0	5	6	5	1.3	-.7
Chemicals and allied products (28)	1,057	1,043	1,043	-15	0	-.1	.0	264	332	415	1.6	2.2
Industrial chemicals (281, 286)	279	253	236	-25	-17	-1.0	-.7	68	78	83	-1.2	.6

See footnotes at end of table.

Table 3. Employment and output by industry, 1988, 1998, and projected 2008 — Continued

(Numbers in thousands)

Industry title and Standard Industrial Classification code	Employment							Output[1]				
	Thousands of jobs			Change		Average annual rate of growth (percent)		Billions on chained (1992) dollars			Average annual rate of growth (percent)	
	1988	1998	2008	1988-1998	1998-2008	1988-1998	1998-2008	1988	1998	2008	1988-1998	1998-2008
Plastic materials and synthetics (282)	177	157	141	-20	-16	-1.2	-1.1	47	56	78	1.8	3.4
Drugs (283)	228	279	309	51	30	2.1	1.0	54	84	117	4.6	3.3
Soap, cleaners, and toilet goods (284)	159	156	165	-4	10	-.2	.6	43	56	64	2.6	1.3
Paints and allied products (285)	63	52	45	-11	-7	-1.9	-1.5	16	18	19	1.2	.7
Agricultural chemicals (287)	52	52	49	0	-3	0	-.6	16	19	23	1.9	1.8
Miscellaneous chemical products (289)	100	94	98	-6	4	-.7	.4	20	23	32	1.3	3.5
Petroleum and coal products (29)	160	140	117	-20	-23	-1.3	-1.8	158	169	183	.6	.8
Petroleum refining (291)	121	96	75	-25	-21	-2.3	-2.5	145	153	165	.5	.8
Miscellaneous petroleum and coal products (295, 299)	39	44	42	5	-2	1.2	-.5	14	16	19	1.6	1.4
Rubber and miscellaneous plastic products (30)	866	1,009	1,130	143	121	1.5	1.1	100	151	221	4.2	3.9
Tires and inner tubes (301)	84	79	66	-5	-13	-.6	-1.8	12	14	17	2.0	1.9
Rubber products, plastic hose and footwear (302, 5, 6)	176	189	199	13	9	.7	.5	17	22	33	2.9	3.9
Miscellaneous plastic products, nec (308)	606	740	865	135	125	2.0	1.6	72	114	171	4.8	4.1
Leather and leather products (31)	143	83	59	-60	-24	-5.3	-3.3	10	9	8	-1.9	-1.2
Footwear except rubber and plastic (313, 4)	89	38	25	-51	-13	-8.3	-4.1	5	3	3	-4.8	.4
Luggage, handbags, and leather products, nec (311, 315-317, 319)	54	45	34	-8	-11	-1.6	-2.7	5	5	4	.1	-2.2
Transportation, communications, and utilities (40-42, 44-49)	5,512	6,600	7,541	1088	941	1.8	1.3	837	1,115	1,502	2.9	3.0
Transportation (40-42, 44-47)	3,301	4,276	4,951	975	675	2.6	1.5	339	493	729	3.8	4.0
Railroad transportation (40)	298	231	185	-67	-46	-2.5	-2.2	35	44	53	2.5	1.8
Local and interurban passenger transit (41)	309	468	622	159	154	4.2	2.9	17	21	27	2.1	2.7
Trucking and warehousing (42)	1,351	1,745	1,944	394	199	2.6	1.1	142	230	353	4.9	4.4
Trucking and courier services, except air (421-423)	1,240	1,579	1,744	338	166	2.4	1.0	134	216	331	4.9	4.4
Warehousing and storage (422)	111	166	200	55	34	4.1	1.9	8	14	22	5.1	4.5
Water transportation (44)	171	180	190	9	10	.5	.5	32	30	36	-.8	1.9
Air transportation (45)	850	1,183	1,400	333	217	3.4	1.7	80	128	203	4.8	4.7
Pipelines, except natural gas (46)	19	14	13	-5	-1	-2.8	-1.0	8	7	9	-.6	1.5
Transportation services (47)	302	455	597	153	142	4.2	2.7	25	33	48	2.8	3.9
Passenger transportation arrangement (472)	171	219	268	48	48	2.5	2.0	10	16	22	4.8	3.2
Miscellaneous transportation services (473-474, 478)	131	236	329	105	94	6.0	3.4	15	17	26	1.2	4.5
Communications (48)	1,280	1,470	1,768	190	299	1.4	1.9	218	329	519	4.2	4.6
Telephone, telegraph and other communication services (481-482, 489)	942	1,042	1,285	100	244	1.0	2.1	166	264	434	4.7	5.1
Cable and pay television services (484)	111	181	230	70	49	5.0	2.4	23	32	48	3.6	4.1
Radio and television broadcasting (483)	227	247	253	20	6	.8	.2	29	34	39	1.4	1.5
Utilities (49)	931	855	822	-76	-33	-.9	-.4	281	292	268	.4	-.9
Electric utilities (491)	452	364	311	-87	-53	-2.1	-1.6	164	191	209	1.6	.9
Gas utilities (492)	164	136	117	-28	-20	-1.8	-1.5	67	52	52	-2.5	-.1
Combined utilities (493)	194	159	131	-36	-27	-2.0	-1.9	30	28	31	-.8	.9
Water and sanitation (494-497)	121	196	263	74	67	4.9	3.0	19	21	24	1.0	1.2
Wholesale trade (50, 51)	6,030	6,831	7,330	802	499	1.3	.7	497	820	1,178	5.1	3.7
Retail trade (52-59)	19,023	22,296	25,363	3273	3,067	1.6	1.3	793	1,065	1,393	3.0	2.7
Retail trade, excluding eating and drinking places (52-57, 59)	12,765	14,536	16,281	1771	1,745	1.3	1.1	578	813	1,098	3.5	3.1
Eating and drinking places (58)	6,258	7,760	9,082	1502	1,321	2.2	1.6	215	253	297	1.6	1.6
Finance, insurance and real estate (60-67)	6,629	7,408	8,367	778	960	1.1	1.2	1,079	1,306	1,788	1.9	3.2
Depository institutions (60)	2,255	2,042	2,100	-213	58	-1.0	.3	275	273	382	-.1	3.4
Nondepository, holding and investment offices (61, 67)	573	908	1,141	334	235	4.7	2.3	63	86	146	3.1	5.4
Security and commodity brokers (62)	447	645	900	198	255	3.7	3.4	57	176	361	12.0	7.5
Insurance carriers (63)	1,435	1,597	1,751	162	154	1.1	.9	158	180	207	1.3	1.4
Insurance agents, brokers and service (64)	640	746	825	107	79	1.6	1.0	73	46	41	-4.6	-1.0
Real estate (65)	1,280	1,471	1,650	190	179	1.4	1.2	458	569	707	2.2	2.2
Royalties	-	-	-	-	-	-	-	43	81	150	6.6	6.3
Owner-occupied dwellings	-	-	-	-	-	-	-	420	528	633	2.3	1.8
Services (70-87, 89)	24,866	36,586	48,543	11720	11,957	3.9	2.9	1,702	2,413	3,556	3.6	4.0
Hotels (701)	1,494	1,719	2,030	225	311	1.4	1.7	87	85	93	-.3	1.0

See footnotes at end of table.

Table 3. Employment and output by industry, 1988, 1998, and projected 2008 — Continued

(Numbers in thousands)

Industry title and Standard Industrial Classification code	Employment							Output[1]				
	Thousands of jobs			Change		Average annual rate of growth (percent)		Billions on chained (1992) dollars			Average annual rate of growth (percent)	
	1988	1998	2008	1988-1998	1998-2008	1988-1998	1998-2008	1988	1998	2008	1988-1998	1998-2008
Other lodging places (702-704)	46	57	58	11	1	2.2	.2	5	5	6	.9	1.5
Personal services (72)	1,056	1,195	1,317	139	122	1.2	1.0	66	77	96	1.6	2.2
Laundry, cleaning, and shoe repair (721, 725)	420	440	467	20	27	.5	.6	20	23	28	1.2	2.0
Personal services, nec (722, 729)	175	234	266	59	32	2.9	1.3	20	25	34	2.1	3.1
Beauty and barber shops (723-724)	381	421	474	40	53	1.0	1.2	19	22	25	1.5	1.4
Funeral service and crematories (726)	79	99	110	20	11	2.3	1.0	7	8	10	1.9	1.9
Business services (73)	4,638	8,584	13,146	3946	4,562	6.3	4.4	273	559	1,093	7.5	6.9
Advertising (731)	229	268	323	39	55	1.6	1.9	23	34	47	4.0	3.2
Service to buildings (734)	780	950	1,187	170	237	2.0	2.3	24	37	50	4.4	3.0
Miscellaneous equipment rental and leasing (735)	180	258	369	79	111	3.7	3.6	23	32	52	3.2	5.0
Personnel supply services (736)	1,350	3,230	4,623	1879	1,393	9.1	3.7	30	78	129	10.2	5.1
Computer and data processing services (737)	673	1,599	3,472	926	1,872	9.0	8.1	77	219	584	11.1	10.3
Miscellaneous business services (732-733, 738)	1,426	2,278	3,172	853	893	4.8	3.4	95	158	229	5.2	3.8
Auto repair, services and garages (75)	834	1,144	1,550	311	406	3.2	3.1	90	140	240	4.4	5.6
Automotive rentals, without drivers (751)	161	200	250	39	50	2.2	2.3	16	50	122	12.4	9.3
Automobile parking, repair, and services (752-754)	672	944	1,300	272	356	3.5	3.2	75	89	116	1.7	2.7
Miscellaneous repair shops (76)	350	382	406	32	24	.9	.6	38	37	38	-.3	.3
Electrical repair shops (762)	108	113	127	5	13	.5	1.1	12	14	16	1.2	1.7
Watch, jewelry, and furniture repair (763, 764)	29	29	26	0	-3	-	-1.1	2	2	2	1.1	-.1
Miscellaneous repair shops and related services (769)	213	240	253	27	13	1.2	.5	24	21	20	-1.1	-.5
Motion pictures (78)	341	573	636	233	62	5.3	1.0	37	42	68	1.4	4.9
Motion pictures (781-783)	238	408	451	171	43	5.6	1.0	33	35	58	.7	5.1
Video tape rental (784)	103	165	185	62	20	4.8	1.1	4	7	10	6.8	3.2
Amusement and recreation services (79)	977	1,601	2,108	624	507	5.1	2.8	63	102	150	4.9	3.9
Producers, orchestras, and entertainers (792)	122	176	225	54	49	3.7	2.5	14	22	33	4.5	4.2
Bowling centers (793)	92	82	70	-10	-12	-1.2	-1.5	4	3	2	-2.7	-2.2
Commercial sports (794)	91	127	160	35	34	3.3	2.4	12	13	13	.5	.6
Amusement and recreation services, nec (791, 9)	671	1,217	1,653	545	436	6.1	3.1	33	65	102	6.8	4.7
Health services (80)	7,106	9,846	12,667	2741	2,821	3.3	2.6	503	637	795	2.4	2.2
Offices of health practitioners (801-804)	1,937	2,949	4,098	1012	1,150	4.3	3.3	211	249	313	1.7	2.3
Nursing and personal care facilities (805)	1,311	1,762	2,213	451	451	3.0	2.3	41	62	74	4.3	1.8
Hospitals (806)	3,294	3,926	4,337	632	411	1.8	1.0	210	254	312	1.9	2.1
Health services, nec (807-809)	564	1,209	2,018	645	809	7.9	5.3	42	72	96	5.7	2.8
Legal services (81)	845	973	1,200	128	228	1.4	2.1	112	126	154	1.2	2.1
Educational services (82)	1,567	2,177	2,690	610	513	3.3	2.1	72	100	136	3.4	3.1
Social services (83)	1,552	2,644	3,678	1092	1,034	5.5	3.4	60	95	137	4.7	3.7
Individual and miscellaneous social services (832, 839)	565	923	1,223	358	300	5.0	2.9	25	42	63	5.4	4.2
Job training and related services (833)	241	369	484	129	114	4.4	2.7	7	11	16	4.6	3.8
Child day care services (835)	356	605	800	248	196	5.4	2.8	16	21	27	2.9	2.5
Residential care (836)	389	747	1,171	357	424	6.7	4.6	13	21	30	5.4	3.7
Museums, botanical and zoological gardens (84)	58	93	131	35	39	4.8	3.6	3	5	7	5.2	3.7
Membership organizations (86)	1,740	2,361	2,600	621	239	3.1	1.0	67	87	104	2.6	1.9
Engineering, management and other services (87, 89)	2,263	3,237	4,328	975	1,091	3.6	2.9	230	326	464	3.6	3.6
Engineering and architectural services (871)	730	905	1,140	175	235	2.2	2.3	81	100	142	2.1	3.6
Research and testing services (873)	492	614	861	122	247	2.2	3.4	30	53	101	5.9	6.7
Management and public relations (874)	508	1,034	1,500	526	466	7.4	3.8	63	114	157	6.0	3.3
Accounting, auditing, and other services (872, 89)	532	684	827	153	143	2.6	1.9	56	61	69	1.0	1.2
Government	17,386	19,819	21,688	2433	1,869	1.3	.9	891	978	1,110	.9	1.3
Federal Government	2,971	2,686	2,550	-285	-136	-1.0	-.5	333	305	309	-.9	.1
Federal enterprises	1,024	987	993	-37	6	-.4	.1	59	74	91	2.4	2.0
US Postal Service	831	867	895	36	28	.4	.3	46	58	72	2.3	2.2
Federal electric utilities	38	30	20	-8	-10	-2.3	-4.1	6	7	8	2.0	1.7
Federal Government enterprises, nec	156	90	78	-66	-12	-5.3	-1.4	7	10	11	3.0	.7
Federal general government	1,947	1,699	1,557	-248	-142	-1.4	-.9	216	172	162	-2.3	-.6
Federal Government capital services	-	-	-	-	-	-	-	58	61	58	.5	-.5
State and local government	14,415	17,133	19,138	2718	2,005	1.7	1.1	558	673	801	1.9	1.8
State and local enterprises	880	910	958	30	48	.3	.5	91	110	131	1.9	1.7

See footnotes at end of table.

Table 3. Employment and output by industry, 1988, 1998, and projected 2008 — Continued

(Numbers in thousands)

Industry title and Standard Industrial Classification code	Employment							Output[1]				
	Thousands of jobs			Change		Average annual rate of growth (percent)		Billions on chained (1992) dollars			Average annual rate of growth (percent)	
	1988	1998	2008	1988-1998	1998-2008	1988-1998	1998-2008	1988	1998	2008	1988-1998	1998-2008
Local government passenger transit	201	212	214	11	2	.5	.1	6	6	7	.2	2.1
State and local electric utilities	82	86	90	4	4	.4	.4	19	23	26	1.8	1.4
State and local government enterprises, nec	597	612	654	15	42	.2	.7	66	82	98	2.1	1.8
State and local general government	13,535	16,223	18,181	2688	1,958	1.8	1.1	467	562	670	1.9	1.8
State and local government hospitals	1,065	983	948	-82	-35	-.8	-.4	34	40	47	1.7	1.5
State and local government education	7,343	8,998	10,195	1655	1,197	2.1	1.3	222	263	305	1.7	1.5
State and local general government, nec	5,127	6,242	7,038	1115	796	2.0	1.2	171	203	236	1.7	1.5
State and local government capital services	-	-	-	-	-	-	-	40	57	83	3.6	3.8
Agriculture (01, 02, 07, 08, 09)[3]	3,355	3,576	3,526	221	-51	.6	-.1	212	267	308	2.3	1.4
Agricultural production (01, 02)	2,292	2,106	1,729	-186	-377	-.8	-2.0	170	219	255	2.6	1.5
Agricultural services (07)	960	1,385	1,724	425	340	3.7	2.2	34	36	42	.4	1.5
Veterinary services (074)	126	217	282	91	65	5.6	2.7	8	9	11	1.8	1.5
Landscape and horticultural services (078)	506	768	993	262	224	4.3	2.6	17	17	19	-.1	1.5
Agricultural services, nec (071, 072, 075, 076)	328	400	450	72	51	2.0	1.2	10	10	12	.2	1.7
Forestry, fishing, hunting and trapping (08, 09)	103	86	73	-17	-13	-1.8	-1.6	9	12	12	2.7	-.7
Private household wage and salary (88)	1,153	962	759	-191	-203	-1.8	-2.3	10	11	10	.9	-.8
Nonagricultural self-employed and unpaid family[4,5]	8,731	9,029	9,925	298	896	.3	1.0	-	-	-	-	-
Secondary wage and salary jobs in agriculture (except agricultural services) forestry, fishing, hunting, and trapping; and private households[6]	211	163	158	-48	-5	-2.5	-.3	-	-	-	-	-
Secondary job as a self-employed or unpaid family worker[7]	1,990	1,897	1,901	-94	5	-.5	.0	-	-	-	-	-
Total[8,9,10]	120,010	140,514	160,795	20503	20,281	1.6	1.4	10,204	13,322	18,241	2.7	3.2

[1] Historical output data are from the Bureau of Economic Analysis, U.S. Department of Commerce.

[2] Excludes SIC 074,5,8 (agricultural services) and 99 (nonclassifiable establishments). The data therefore are not exactly comparable with data published in Employment and Earnings.

[3] Excludes government wage and salary workers. Includes private sector for SIC 08,09 (forestry, fishing, hunting and trapping).

[4] Excludes SIC 08,09 (forestry, fishing, hunting, and trapping).

[5] Comparable estimate of output growth is not available.

[6] Workers who hold a secondary wage and salary job in agriculture (except agricultural services); forestry, fishing, hunting, and trapping; and private households.

[7] Wage and salary workers who hold a secondary wage and salary job as a self-employed or unpaid family worker.

[8] Wage and Salary data are from the Current Establishment Statistics (payroll) survey, which counts jobs, whereas self-employed, unpaid family workers, agricultural production, forestry, fishing, hunting, and trapping, and private household data are from the Current Population Survey (household survey), which counts workers.

[9] Subcategories do not necessarily add to higher categories as a by product of chain-weighting.

[10] The Total category includes secondary jobs: wage and salary and secondary jobs: self-employed and unpaid family workers.

Table 4. Factors affecting industry output and employment, 1998-2008

SIC code	*Industry title*	*Growth factors affecting output and employment*
01, 02	Agricultural production	Increasing farm size, coupled with rising foreign competition and increasing productivity, will result in declining employment of both self-employed and wage and salary employees.
074	Veterinary services	Growth of spending for special pet services should lead to strong output growth, which will translate to moderately strong increases in employment.
078	Landscape and horticultural services	Rising disposable incomes and a construction boom (particularly in the Sunbelt with longer summers) will increase demand and employment.
071, 072 075, 076	Agricultural services, n.e.c.	The Freedom to Farm Act, increased competition from foreign producers, and increasing shifts to large agribusiness establishments, have resulted in strong productivity increases, moderation in the growth of domestic production, and declining employment levels. It is anticipated that these trends will continue over the coming decade.
08, 09	Forestry, fishing, hunting, and trapping	As Federal and State Governments continue to close fisheries in order to relieve the pressure on depleted stocks of fish, employment will decline. Increasing use of clearcutting methods, with the concomitant increases in productivity in logging, also will lead to lower employment. Growth of tree farms, game preserves, and forest nurseries will help to offset to some extent the negative factors.
10	Metal mining	Employment in this sector is expected to decline due to advances in mine technology and automation, which lead to a smaller, more productive workforce. Imported specialty steels and other metals will be another negative factor affecting domestic employment.
12	Coal mining	Though coal is facing competition from other fuel sources, continued advances in mining technology and in the clean use of high-sulfur coal will slow the loss of its market share. As the population grows, coal production is expected to grow.
131, 132	Crude petroleum, natural gas, and gas liquids	The oil and gas industry is experiencing consolidation, continuing improvements in exploration and drilling technologies, and continued growth in outsourcing, all leading to higher productivity, lower demands for employment, and shifts of employees from this industry to oil and gas field services.
138	Oil and gas field services	Continued outsourcing from the crude petroleum industry for key extraction and exploration activities will cause employment to increase. Employment also is affected by global oil prices; continued expectations for only moderate growth in these prices will soften somewhat the positive impacts of outsourcing on employment.
14	Nonmetallic minerals, except fuels	The major factor affecting employment in this industry is that mining in many other countries is less heavily regulated (an thus more profitable) than in the United States, leading to increasing mining and exploration by many companies in these countries. As a result, domestic employment in this industry is expected to decline over the projection period.
15, 16, 17	Construction	Employment is expected to grow slightly slower in the future as a result of several factors, including slower population growth, overbuilding of commercial and multi-unit structures, elimination of tax incentives for real estate ownership, technology trends favoring substitution of home offices for office buildings, and continued Federal budget restraints. In addition, declining numbers of young adults entering the 25- to 45-year-old age group, which is the prime home buying age, will further restrain the demand for new single family housing. However, the need to modernize existing industrial structures and build roads and bridges will somewhat offset these negative factors. Only minimal increases in productivity are expected in this labor-intensive industry.
241	Logging	Employment growth depends on both the demand for and availability of domestic timber. The demand for wood and paper products is driven by an expanding population and new housing starts but will be somewhat dampened by substitutes for lumber in residential construction. Increasing imports of timber will help meet domestic demand for these products. Productivity gains due to increased mechanization will result in slow wage and salary employment growth.

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
242	Sawmills and planing mills	Demand for structural sawmill wood products is affected by population growth and new housing starts. It also is affected by availability of imported milled products and by pressure on domestic logging production, which in turn depends on forest policy and management decisions. Both output and employment in this industry are expected to decline over the projection horizon.
243	Millwork, plywood, and structural members	Growth depends on a growing population and new housing starts. Output and employment are expected to remain relatively flat in this industry as continued pressure on domestic logging is counteracted by increasing imports.
324	Hydraulic cement	There have been substantial increases in productivity as a result of production automation and the continued shutting down of smaller, less productive kilns. Productivity also has been improved by a concentration of new capital investment in plants using the dry process of cement manufacture. The more energy-intensive wet process is expected to be phased out at an accelerating rate. Employment in the U.S. cement industry is expected to continue to decline at a moderate pace in the coming decade.
325, 326 328, 329	Stone, clay, and misc. mineral products	Output is expected to remain fairly flat and productivity will continue to increase, resulting in declining employment in this industry.
327	Concrete, gypsum, and plaster products	This industry manufactures products that are used by virtually every sector of the construction industry. Thus, employment growth should be tied closely to the growth of the construction industry, which is expected to be somewhat slower than that of the economy as a whole due to slower growth in residential and nonresidential construction.
331	Blast furnaces and basic steel products	Increased use of steel framing in both residential and nonresidential construction will fuel higher output. However, increases in demand will be absorbed by gains in productivity, resulting in decreased employment.
332	Iron and steel foundries	This industry is a major supplier to the automotive sector. Employment growth will moderate, however, as continuing improvements in productivity are realized. Output growth will be limited as motor vehicle manufacturers increasingly substitute other materials, such as plastics or ceramics, in the production process.
333	Primary nonferrous smelting and refining	Employment is expected to decline due to increases in productivity. Small increases in output are expected, but will not be enough to offset the higher productivity impacts on employment.
341	Metal cans and shipping containers	Increasing imports will hold down domestic output growth. Employment will drop due to productivity increases. A trend toward the use of plastic bottles also will serve to dampen production in this industry.
342	Cutlery, handtools, and hardware	Productivity gains realized from the implementation of automated metal cutting and molding machines is expected to continue to offset demand growth, resulting in employment declines in this industry.
343	Plumbing and nonelectric heating equipment	Demand for nonelectric heating equipment is primarily dependent on new construction and replacement needs. The fairly rapid increase in electric heating has dampened growth in this industry; employment will remain flat.
344	Fabricated structural metal products	This industry is strongly tied to construction of commercial and residential buildings. Significant productivity increases, tied to only moderate construction demand growth, leads to flat employment.
348	Ordnance and ammunition	Productivity growth, coupled with slower growth in Defense Department demand and increasing legal pressures on the industry, will lead to declining employment.
349	Miscellaneous fabricated metal products	Demand for output of this industry is expected to remain strong due to both domestic needs and growing exports. Productivity growth will limit employment.
351	Engines and turbines	Moderately strong output growth is anticipated, due primarily to good export performance. Employment, however, will continue to decline in the face of strong productivity growth.

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
352	Farm and garden machinery	Output in this industry continues to grow, due primarily to export demand. However, productivity growth more than offsets the demand increases, resulting in declining employment.
353	Construction and related machinery	Output is expected to grow strongly in the coming decade, the result of both moderately strong domestic demand and burgeoning foreign markets. Moderate productivity growth does not offset the demand change and, as a result, industry employment will grow in the coming decade.
354	Metalworking machinery and equipment	Employment will decline slightly as imports grow and metalworking machinery producers raise productivity through new investments in computer-controlled automation and industrial consolidation.
355	Special industry machinery	Productivity will rise in this industry due to increasing automation and the move toward larger establishments. Output growth will more than offset the productivity growth, however, resulting in a small increase in employment.
356	General industrial machinery and equipment	Productivity will rise in this industry due to increasing automation and the move toward larger establishments. Output growth will more than offset the productivity growth, however, resulting in a small increase in employment.
357	Computer and office equipment	Output growth is faster in this industry than in most other industries in the projections. However, this is likely to be accompanied by high rates of productivity growth, resulting in slight declines in employment.
363	Household appliances	Output for this industry is tied mainly to the new residential construction market, where moderate growth correlates to moderate growth in demand for household appliances. Productivity growth leads to employment declines throughout the projection period.
365	Household audio and video equipment	The advent of several new technologies is expected to have significant impacts on output growth: DVDs (compact disks for TVs), the move from analog to digital for radio and TV (the basis for High Definition TV), and WEB TV 'appliances.' Imports are expected to satisfy much of the relatively strong demand growth. Strong import growth coupled with strong productivity increases should result in employment declines.
366	Communication equipment	The move to digital communications will usher in a new period of upgrades. Communication lines external and internal to buildings will be outfitted for faster access to the Internet. The industry should experience steady growth in demand for its output, but equally steady productivity growth will result in only modest increases in employment.
367	Electronic components and accessories	Because this is the one high-tech industry in which U.S. plants are highly competitive with Pacific Rim countries, strong demand growth translates to healthy employment improvements over the coming decade.
369	Miscellaneous electrical equipment	Increased business investment stimulates output growth. More efficient manufacturing techniques would decrease employment.
371	Motor vehicles and equipment	Because of the Internet and the growth of e-commerce, the major corporations in this industry will change the way they work with their suppliers to combine parts and subassemblies into finished automobiles. Combining the efficiencies of just-in-time inventory management with those of increasingly automated production line processes will result in employment declines for this industry despite moderately strong growth in output.
372, 376	Aerospace	Asian and Latin American markets, which were previously some of the fastest growing markets, are having financial difficulties that limit aircraft purchases. Constrained foreign sales will be more than offset by sales in the domestic market resulting from the projected increase in passenger miles, but growth will be limited for the next couple of years. The increased research and possible implementation of an air missile defense system, the replenishment of missiles used in foreign conflicts, and the increased use of satellites should increase demand for the output of SIC 376, Guided missiles, space vehicles, and parts. The possible production of the Joint

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
		Strike Fighter and F-22, upgrades to meet the new noise and environmental regulations, and the growth and opening of additional Asian and other foreign air transport routes should stimulate employment in SIC 372, Aircraft and parts. On the whole, both output and employment should continue to grow at current rates.
373	Ship and boat building and repairing	Employment will continue to decline in this industry as military spending and gas company demand for oil drilling platforms continue to decline.
374	Railroad equipment	The rail transportation industry is expected to improve its existing rails and equipment in the shortrun. Large inefficiencies and regulation/deregulation efforts have hampered the prospects for the rail industry as a whole. As the directors of the main American rail companies redefine their goals and direction, the industry will attempt to take advantage of the large market that is available to it. Once this is done, real growth will be seen in rail transportation and then, as a by-product, in the manufacture of equipment for the industry. The development of new high-speed electric rail cars will influence equipment output and employment. A small employment increase is expected.
375, 379	Miscellaneous transportation equipment	Demand for recreational equipment, such as bicycles, motorcycles, RV's, and snowmobiles, will continue to increase. Lifestyle changes have made outdoor activities more attractive. Many people have abandoned traditional vacation places in search of adventurous destinations. The demand for equipment for these adventures has never been stronger. Automation will continue to increase productivity. This will moderate employment increases.
381	Search and navigation equipment	More satellites and greater accessibility of GPS (the Global Positioning System) will mean that modernization of ground-based navigation systems will be good for employment in this industry. The Federal Radio Navigation Plan will try to ensure that GPS replaces older, ground-based systems by 2010.
384	Medical equipment, instruments, and supplies	Employment and output growth will result from an aging population and new medical technologies.
385	Ophthalmic goods	Output is expected to grow due to increases in demand for eyeglasses and contact lenses from an aging population. However, only minimal increases in employment are expected due to improved technology and more efficient equipment.
386	Photographic equipment and supplies	Changes in office automation and business systems generate new demand for copiers, scanners, and other equipment that produce photographic images. Additionally, the advent of digital photography technologies will open an entirely new market for photo equipment producers. Productivity improvements will cause employment to decline.
387	Watches, clocks and parts	This industry benefits from a strong economy. Employment is expected to decline because of the increase in productivity. The declining balance of trade has caused a significant reduction in this industry's domestic output.
201	Meat products	Moderately strong output growth translates to strong employment growth in this low productivity industry.
202	Dairy products	New plant and equipment along with new processing methods are boosting output and productivity, while the increasing automation drives down employment. Output will grow in line with population growth.
203	Preserved fruits and vegetables	Improvements in slicing and packaging equipment will increase productivity and reduce employment. Output growth will keep pace with productivity gains.
204, 207	Grain mill products, fats and oils	The number and size of livestock in this country will help determine the future of this industry. Employment is likely to remain flat as productivity remains high.
205	Bakery products	Output is expected to decline slightly due to changing consumer preferences, including those of an older population that may be shying away from food that is high in sugar content, such as bakery products. Reduced output and productivity increases resulting from new slicing and packaging machines should cause employment to decline.

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
206	Sugar and confectionery products	Rapidly increasing productivity caused by new plant and equipment will decrease employment slightly. Output growth will keep pace with productivity advances.
208	Beverages	Although the population is expected to consume more beverages, employment is expected to decline in this capital intensive industry due to automation gains in filling and packaging machines.
209	Miscellaneous foods and kindred products	Employment is likely to decrease as productivity continues to rise. Output will increase slightly as demand for miscellaneous food products increases with population growth.
21	Tobacco products	Employment will continue to decrease as technology and productivity increase and fewer people smoke and chew tobacco.
221-224, 226, 228	Weaving, finishing, yarn, and thread mills	Employment is expected to decline primarily as a result of increasing productivity brought about by the use of faster looms, the further automation of inspection machines, and continued consolidation among textile producers.
225	Knitting mills	Employment will decline as a result of productivity gains caused by the implementation of faster knitting machines. The competitiveness of U.S. producers, coupled with the development of new knit products, should help to moderate the decline.
227	Carpets and rugs	Employment will increase due to growing demand from residential and commercial construction. Despite growing consolidation of carpet and rug production, productivity is not expected to increase rapidly.
229	Miscellaneous textile goods	Despite growing output, employment will decline as a result of rapid productivity gains brought about by increasing automation and the growing concentration of producers in this industry.
231-238	Apparel	Employment will continue to decline rapidly in this industry as imports rise and apparel producers shift the more labor-intensive operations, such as sewing, to other nations. The transfer of these lower value-added functions, coupled with new work structures such as cellular manufacturing, will lead to productivity gains.
239	Miscellaneous fabricated textile products	The growing demand for bedding, draperies, and other textile products will drive employment increases.
271	Newspapers	Employment and output in newspapers will decline slightly, due to automation of, and competition from nonprint media sources (in particular, the Internet). People will still continue to read the newspaper in print, but with the growing acceptance of the Internet, people will have a much greater access to a wider variety of news media. Productivity will increase due to automation of the printing process.
272	Periodicals	Employment and output will grow slowly due to continued interest in and need for certain publications (specifically, professional, scientific, and technical) demand on an international scale also will provide momentum for periodicals. Also contributing to growth is the fact that U.S. publishers have expanded their titles to other foreign markets and have created spin-off titles and other products to attract more advertising and readers. Productivity is increasing slowly.
273	Books	Employment will increase slightly due to the growing population's demand for books at all levels of education and the aging population's increased leisure time. Output will increase slightly due to expanding international markets. Book publishing in the United States is changing from an essentially domestic activity to one with global implications. Productivity will increase slightly due to efficiency of process.
274	Miscellaneous publishing	Employment and output will increase slightly due to implementation of the advanced technology available today. Technological change is expected to have a market impact on the industry in the years ahead. Productivity will increase due to expanding business markets and technology.
275, 276	Commercial printing and business forms	Employment will level off due to the adoption of advanced technologies, such as digital print techniques. Digital processors can produce color-corrected film, and can transfer digital text and images directly to printing plates. Output and productivity

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
		will increase slightly due to expanding business markets and advances in technology gains.
277	Greeting cards	Employment and output will increase slightly due to the aging of baby-boomers, and the targeting by companies of specific ethnic, religious, and lifestyle markets. Many companies also are producing new card lines that are more relevant to consumers' situations and relationships. Productivity will increase slightly due to technology advances; automation of process with graphics software; adoption of color printers and presses; and shorter runs.
278	Blankbooks and bookbinding	Employment and output will decrease due to maturation of the industry and a greater reliance on overseas manufacturing. Productivity will remain the same because the industry has been less affected by technology than have other printing functions the last 10 years.
279	Service industries for the printing trade	Major changes in the technology of printing and prepress services mean that more and more of these operations can be effectively carried out in-house, rather than being contacted out to a service bureau. Thus, both output and employment are expected to decline in this industry in the coming decade.
281, 286	Industrial chemicals	The continued overall strength of the construction and motor vehicle industries should have a positive impact on this industry. Increased capital spending on new, environmental friendly equipment has had a positive effect on productivity, decreasing employment. International competition and levels of imports should continue to increase, putting additional pressure on both output and employment.
282	Plastics materials and synthetics	The output from this industry is used in many of the goods-producing industries such as construction, motor vehicles, and goods packaging. Output growth is expected to continue strong in this industry despite continued growth in import penetration rates. Employment will continue its historical decline in response to moderately strong productivity growth.
283	Drugs	Population growth, an aging population, and a strong program of research and development are the major determinants contributing to both output and employment growth in this industry.
284	Soap, cleaners, and toilet goods	Population growth is the primary determinant of output growth in this industry, but an increasing proportion of demand is being satisfied with imported products. The relatively low rate of productivity growth should lead to moderate increases in employment.
285	Paints and allied products	Domestic output growth is quite slow in this industry because of increasing import penetration that, combined with relatively strong productivity growth, will lead to declining employment.
287	Agricultural chemicals	The largest components of this sector include fertilizers and pesticides. The United States already uses advanced agricultural practices, so domestic growth should be limited, but markets are opening in developing nations as they adopt more modern agricultural methods. This increase in output, however, should be more than offset by increases in productivity, leading to employment declines.
289	Miscellaneous chemical products	As environmental concerns increase, efforts will focus on more environmentally friendly compounds for use as adhesives, sealants, and printing inks. Output growth is closely related to domestic output. Increases in productivity should partially offset increased demand, leading to a slight increase in employment.
291	Petroleum refining	Despite environmental awareness, consumers continue to buy large, energy-inefficient vehicles. This, combined with strong demand from airlines for jet fuels, will continue to drive output at a moderate pace. The growth of output is moderated to some extent by increasing import penetration rates. Strong productivity growth in this industry leads to further declines in employment.
295, 299	Miscellaneous petroleum and coal products	Output in this industry is driven by production throughout the economy, and it continues to expand apace with GDP. Productivity growth has resulted in virtually flat employment.

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
308	Miscellaneous plastics products, n.e.c.	Employment increases will be driven by growing demand for plastic products and increasing substitution of plastic for other materials in production. Employment gains will be moderated by the broader implementation of laborsaving, computer-controlled automation in the industry.
40	Railroad transportation	While output is expected to continue to expand at a moderately strong pace, employment is expected to continue its historical declines as crew size shrinks and more trains are run with automated dispatching techniques.
41	Local and interurban passenger transit	Strong growth in both output and employment is expected in this industry as State and local governments increasingly push light rail as an answer to inner-city pollution and congestion.
421, 423	Trucking and courier services, except air	Opportunities will increase in the trucking and warehousing industry as more manufacturers outsource their manufacturing processes. Output growth will be very strong, and employment will increase steadily.
422	Warehousing and storage	Opportunities will increase in the trucking and warehousing industry as more manufacturers outsource their manufacturing processes. Output growth will be very strong and employment will increase steadily.
44	Water transportation	Employment in this industry will begin facing less competition from foreign "flags of convenience" in light of a recent agreement to enact labor standards. However, imports of steel will continue to hurt trade on the Great Lakes, while Asian economies will continue to export to the United States. on ships with foreign crews. Even with rising business in cruise lines, growth in employment will only be modest.
45	Air transportation	Passenger and cargo traffic is expected to increase, as will employment, in response to increases in population, income, and business activity. Employment in other air transportation activities also is expected to rise as more aircraft are purchased for business, agricultural, and recreational purposes. Air travel has become an affordable means of transportation for more and more people. A more mature population, in combination with growing propensity to travel, should continue to fill airline seats and provide increased demand for aviation services.
46	Pipelines, except natural gas	Decreases in employment will result from advances in pipeline/pumping station technology. Output is expected to increase in response to the growing demand for petroleum.
472	Passenger transportation arrangement	Employment will continue to increase as air travel becomes more affordable and leisure time increases.
473, 474 478	Miscellaneous transportation services	Employment exhibits strong growth but, due to the nearly nonexistent productivity growth for this industry, output is expected to grow only moderately.
481, 482 489	Telephone and telegraph communications and communication service	Strong demand for new telecommunications services, such as Internet access and wireless communications, will lead to an expansion of telecommunications infrastructure. The laying of cable lines, installation of transmitters, and expansion of satellite networks will provide increased levels of output and create strong employment growth.
484	Cable and pay television services	Upgrading of cable and other pay television infrastructure will allow providers to deliver telephone and Internet services as well as television programming. As a result, both employment and output will increase.
483	Radio and television broadcasting	Firm consolidations and increasing competition from new technologies will limit the growth of output and employment.
491	Electric utilities	Employment will decline due to industry deregulation and increased productivity. Output is expected to increase slightly.
492	Gas utilities	Industry deregulation and restructuring will lead to increases in efficiency and decreases in employment.
493	Combined utilities	Deregulation and improved efficiency will result in continued employment decline. Output and productivity are expected to increase.

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
494-497	Water and sanitation	Population growth in rural areas will boost demand for water and sanitation services. Good employment opportunities will result in this industry.
50, 51	Wholesale trade	Gains in technology for purchasing, ordering, shipping, and selling functions will cause the growth in output and productivity to outpace increases in employment.
52-57, 59	Retail trade, except eating and drinking places	Growth in output will outpace productivity growth due to gains in technology and mergers. Employment also is expected to increase, but not as quickly as output.
58	Eating and drinking places	People are willing to eat out more and spend more in restaurants. As the population ages, more growth is likely in slower paced restaurants than in fast food. Both employment and output will increase.
60	Depository institutions	Output will increase as banks begin offering a variety of financial products to compete with other financial service companies. Employment growth will be limited due to mergers and the resulting layoffs of redundant workers. Technology also will cause continued streamlining of back office functions and reduce the need for tellers. However, employment growth at small banks and credit unions will offset declines in jobs at large banks.
61, 67	Nondepository institutions; holding and investment offices	Low interest rates will keep demand for loans high, increasing output and employment for these nonbank lenders. Banks also are opening their own finance and mortgage banking companies which is causing employment to increase in this industry while it decreases in the banking industry.
62	Security and commodity brokers	With the baby-boomers in their peak savings years, and the population, in general, becoming more sophisticated about investing, the securities and mutual fund markets will continue to grow and to attract investors seeking higher returns on their investments. The increase in self-directed pension plans will continue to drive demand in this industry and will boost the employment of investment advisors to help people invest this pool of money. Large employment increase is expected.
63	Insurance carriers	A growing population will demand more insurance services, particularly health insurance, and thus drive employment growth. Also, an increasing number of businesses will require property and liability insurance. More direct sales by insurance carriers through the Internet and by telephone will boost demand for computer specialists and telephone marketers.
64	Insurance agents, brokers, and service	Computerization and consolidation will make insurance agencies more productive and limit job growth. Insurance carriers also will try to cut costs by offering insurance policies directly to the public, bypassing the agent. Increased outsourcing of the functions of claims representatives will increase employment in the insurance service sector.
65	Real estate	New technology will forceout some smaller players. The Internet will allow consumers to do much of the work of real estate agents, though not all of it. Employment growth will be slow.
701	Hotels and other lodging places	Employment will grow as the number of hotels expands along with the increase in entertainment services and as Americans continue to travel more. This industry has a cyclical nature.
702-704	Other lodging places	More personalized attention and more training-type camps will lead to more employment.
722, 729	Personal services, n.e.c.	Major factors contributing to employment growth in this industry are high levels of disposable income as the Baby Boom generation moves into its prime earning years, and increases in leisure time activities.
723, 724	Beauty and barber shops	Population growth and rising incomes will fuel the demand for cosmetology services. The labor-intensive nature of the industry should generate employment growth.
726	Funeral service and crematories	The increase in deaths among the aging Baby Boom generation will result in strong demand that will cause expanded employment.

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
731	Advertising	Employment will increase, particularly in information technology and professional sectors. The Internet is a new media outlet that will provide an additional area in to advertise. The self-employed sector may grow at a slower rate as a result of mergers in the industry.
734	Services to buildings	The workers in this industry always will be needed in large numbers to clean and maintain buildings. Both employment and output will have a relatively strong increase.
735	Miscellaneous equipment rental and leasing	The rapid growth of this industry is primarily a result of the increased popularity of leasing. The advantages of leasing include a smaller capital outlay and protection against shorter product cycles. Employment will increase.
736	Personnel supply services	Rapid employment growth will continue because of several factors. The industry continues to increase the amount and variety of occupations it employs. It has expanded to include many professional occupations, such as accountants, lawyers, managers, and engineers. In addition, a growing number of firms continue to utilize these workers as a way to reduce costs and retain a "flexible workforce." Finally, many firms use these agencies as means for locating permanent employees on an initial trial basis.
737	Computer and data processing services	This industry comprises the bulk of what others refer to as the information technology industry and includes computer software, networking and data communications, and Internet and on-line services along with data processing, maintenance and repair, and other specialized consulting. Businesses should continue to contract out computer-related functions to establishments in this industry to meet their changing computing needs. The U.S. software market is technology driven, and employment continues to flourish. Computer networking and data communications has become one of the fastest growing and technologically dynamic segments. Factors increasing demand for networks and network products and services are the Internet, the expansion of intranets and extranets, remote access needs, an increase in the number of personal computers connected to local area networks, increasing complexity with growing number of users and size, and the growing importance of security. Both output and employment show strong growth for this projection period.
732, 733 738	Miscellaneous business services	Increased demand for services should result in moderate increase in output and employment.
751	Automotive rentals, without drivers	Historical trends show fast output growth. Employment also has steadily increased; continued growth is expected. This industry benefits both consumers and businesses through lease and rental arrangements. Customers have a less expensive alternative to purchasing a vehicle. Businesses benefit from the constant flow of used cars for resale.
752-754	Automobile parking, repair, and services	The numbers of carwashes, quick oil change companies, and other automotive specialty repair shops are increasing rapidly. More parking garages are providing services for commuters such as carwashes, oil changes, detailing, and minor repairs. As a result, employment is expected to increase.
762	Electrical repair shops	The expanding number of electrical and electronic products, and their service needs, drives the continuing employment increase.
763, 764	Watch, jewelry, and furniture repair	Factors contributing to employment growth are large amounts of disposable income, relatively rapid growth in personal consumption expenditures, and demographics of the Baby Boom generation. Import penetration by battery operated watches needing fewer repairs has kept, and is expected to keep, both output and employment levels flat.
781-783	Motion pictures	The technology available to motion picture studios is not available in people's homes, which means that people will continue going out to see motion pictures. Output has a steady growth. However, digital television has forced employment downwards and may continue to do so in the future.

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
784	Video tape rental	An increase in people's leisure time and in their willingness to watch movies has kept output at a steady pace. Employment will increase.
792	Producers, orchestras, and entertainers	The age of the population is increasing, and older people like this type of entertainment. Additionally, as leisure time continues to increase in more people will be exposed to this form of entertainment. All large theme parks have incorporated live music and theater into their presentations.
793	Bowling centers	Employment is likely to continue to fall as technology allows larger alleys to use fewer workers. Additionally, the number of bowling establishments is likely to decrease as other forms of entertainment replace bowling.
794	Commercial sports	Increased interest in commercial sports, including founding of several new leagues and teams, has caused, and will continue to cause, employment increases.
791, 9	Amusement and recreation services, n.e.c.	Focus on family activities and safety will boost employment. Additionally, personalized service and other forms of low-tech service will increase in amusement parks. Employment will rise.
801-804	Offices of health practitioners	Consumers will continue to demand a high level of quality services from these practitioners. New and improving medical technologies will allow more services to be provided in less costly outpatient settings. Employment will increase.
805	Nursing and personal care facilities	A growing and aging population will increase the demand for long term care services, but industry growth will be somewhat restricted by attempts to control costs by providing some services in alternate settings, such as adult day care centers, residential care facilities, and patients' homes. Continued growth in demand for high-quality long-term care services will mitigate the effects of Federal legislation imposing limits on reimbursement for services. A large employment increase is expected.
806	Hospitals	Projected employment growth will be slower than historically, due to continuing emphasis on cost control by facility administrators, insurers, and consumers. Fastest growth will occur in outpatient and ambulatory care departments, where costs are lower. Hospitals will continue to adjust to reduced reimbursement levels and the shift of patient care away from the expensive inpatient sector.
807-809	Health services, n.e.c.	Continued strong demand for home health care and other outpatient services provided by this industry will help mitigate the effects of Federal legislation imposing limits on reimbursement for home health care services. A large employment increase is expected.
81	Legal services	Employment growth should be encouraged as new legal issues emerge with the introduction of the Internet into business transactions. In addition, there should be an increase in litigation due to a rise in the amount and complexity of business activities.
82	Educational services	Demand for educational services and employment will continue to expand. In addition, demand from postsecondary students and for corporate training services should continue to grow.
832, 839	Individual and miscellaneous social services	Demand is the biggest cause leading to both employment and output growth. This is best measured by the levels of personal consumption and government expenditure in the industry.
833	Job training and related services	Factors that result in employment growth in this industry are changes in the economy, business cycles, and business practices that lead to a restructuring of industry. Changes in technology requiring job retraining to accommodate new systems, machinery, and technology are also important factor. Change in legislation, such as "welfare-to-work" enactments that require changes in the way workforce entrants are trained, is also a key factor. Both employment and output are expected to increase.
835	Child day care services	Demand for child care services will be strong as governments continue to promote and fund child care in licensed facilities and services for welfare mothers returning to work. Strong employment growth should result.

Table 4. Factors affecting industry output and employment, 1998-2008—Continued

SIC code	*Industry title*	*Growth factors affecting output and employment*
836	Residential care	Factors contributing to employment growth in this industry are increased levels of government spending, the growing size of the eligible noninstitutionalized population, and increases in private consumption spending for the private care of individuals. Both employment and output are growing.
84	Museums, botanical and zoological gardens	Employment and demand will grow as public interest in science, art, and history increases.
871	Engineering and architectural services	Both the sophistication of software and the increased use of computers should increase productivity and limit employment growth. Offsetting that should be an increase in demand as firms contract out these services.
873	Research and testing services	The growing importance of R & D for advancing technology in the sciences, such as the surge in genetic research and mapping, should stimulate demand and output. Continued increases in productivity should be more than offset by increased demand. Both employment and output should continue to grow at relatively strong rates.
874	Management and public relations	Employment and output will continue to increase as companies make improvements designed to reduce overall expenses. Companies may achieve this by outsourcing or using consultant services. Productivity would decrease due to downsizing.
872, 89	Accounting, auditing, and other services	Employment growth is due to the expansion of the services that they offer to clients. The industry will be less dependent on traditional accounting and auditing services for revenue. Employment as well as revenue growth will be driven by the demand for consulting, management, financial, and assurance services.
88	Private households	Child care and house cleaning services, which most workers in this industry provide, are expected to be performed more often by specialized, efficient firms. Government regulation of the workplace makes the use of private household workers expensive relative to the use of specialized firms. Employment will decline.
...	US Postal Service	Employment growth will be limited as automation increases productivity. Industry output will be negatively affected by the stagnation of First class mail over the projection period, as customers choose alternative methods and services.
...	Federal electric utilities	Employment growth will decline slightly as the Federal Government outsources blue-collar and technical support positions in order to cut costs.
...	Federal Government enterprises, n.e.c.	Employment should decrease significantly as government outsources sales, technical, and blue-collar jobs.
...	Federal general government	Output and employment should decline as the trend toward a smaller role for the Federal Government continues.
...	Local government passenger transit	The relative size of government and the influence of mass transit programs and initiatives will shape the industry; employment will be flat.
...	State and local electric utilities	Industry deregulation on the national level will increase state and local participation in some areas of the country. Increases in employment and output are expected to occur as a result.
...	State and local government enterprises, n.e.c.	Employment will increase at a slower than average rate as more blue-collar and service jobs are outsourced out to the private sector.
...	State and local government hospitals	Public hospitals provide intensive services to trauma victims, the poor, and uninsured. As more communities shy away from providing safety-net services directly, more State and local government hospitals will either close or be converted into community general hospitals (usually private, not-for-profit institutions). Employment will decline.
...	State and local general government, n.e.c.	There will be only a small increase in employment by State and local governments, despite their assumption of responsibilities previously undertaken by the Federal Government, because of continuing outplacement of blue-collar and technical service workers.

Table 5. Factors changing occupational utilization, 1998-2008

Matrix occupation	*Factors changing occupational utilization*
Able seamen, ordinary seamen, and marine oilers	The replacement of aging ships with new ships equipped with state-of-the-art equipment will lead to productivity gains for these workers and a small decrease in share of industry jobs.
Accountants and auditors	The use of accounting and other computer software will allow clerical staff to handle more accounting tasks, leading to small to moderate job decreases in the Federal Government and in accounting, auditing, and bookkeeping firms. Moderate increase is expected in management and public relations, where accountants have diversified their services and an increasing proportion of workers provide accounting services under contract.
Actors, directors, and producers	Small to moderate increases are expected in advertising, radio and television broadcasting, cable TV, and motion picture production and distribution. Increasing demand for high-quality cable and television shows, advertisements, and movies will drive these increases.
Actuaries	A large decline is expected in services, n.e.c, in which consulting services other than actuarial are growing more quickly.
Adjustment clerks	The need for adjustment clerks to resolve customer complaints and answer questions regarding service options, bills, and policy coverage will result in small to moderate increases for all industries.
Administrative services and facility managers	Only a small increase is expected for in management and public relations, as public and private organizations continue to contract out and streamline administrative services to cut costs.
Advertising, marketing, promotions, public relations, and sales managers	There will be a small decrease in wholesale trade, as more firms contract out advertising, marketing, and public relations functions. A small increase in employment share is expected for the advertising, marketing, and public relations industry due to a growth in new departments devoted to Internet and other specialized services. There is a trend toward smaller, more responsive firms that offer a variety of services.
Aerospace engineers	There will be a small increase in guided missiles, space vehicles, and parts due to the research and development-intensive nature of the industry. Small decreases are expected elsewhere, as computer design and testing increase productivity.
Aircraft assemblers, precision	A small decrease is projected in guided missiles due to falling production and upgrading of electronics.
Aircraft mechanics and service technicians	A small decrease occurs as productivity increases due to greater use of automated inventory control and modular systems, which speed repairs and parts replacement.
Aircraft pilots and flight engineers	A small decrease is expected as airlines continue to cut the size of cockpit crews from three to two members, and as pilots operate larger planes.
Amusement and recreation attendants	Small increase in hotels and motels, as growth in personal income and leisure time increases the relative demand for the services these workers provide.
Animal caretakers, except farm	Small increases in membership organizations, n.e.c, as humane societies and animal shelters, which help control the pet population, grow in importance.
Artists and commercial artists	A large increase is expected in newspapers and periodicals due to the need to provide additional visual appeal for these industries' products. Moderate increase is projected for commercial printing and business forms because of increased access to computer graphics and color design and more media outlets. Increased use of in-house computer graphics and the need to add more visual appeal to industry literature will result in a small increase in motion picture production and distribution, management and public relations, and miscellaneous publishing.
Automotive body and related repairers	A moderate increase is projected for automotive repair shops because firms will increase the size and output of their body shops to remain competitive.
Automotive mechanics and service technicians	There will be a moderate increase in department stores as more discount department stores offer auto repair services. Convenience stores and car washes will replace full service repair shops, resulting in a large decrease in gasoline service stations. However, a large increase in automotive services, except repair, is expected because of growth in establishments that offer auto maintenance services.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Baggage porters and bellhops	There will be a small decreases in most industries, as more travelers carry their own luggage.
Bakers, bread and pastry	A moderate increase is expected in grocery stores, as more space is allocated to store brands and prepared foods. There will be a small increase in eating and drinking places, as restaurants differentiate themselves through freshly prepared products.
Bakers, manufacturing	Moderate increases are expected in all industries, due to growth in demand for baked goods and heat-and-serve pastry products. Processing of baked goods will continue to shift to large-scale manufacturers because of food safety concerns and increased efficiency due to automation.
Bank tellers	A small decrease is projected for commercial banks, savings institutions, and credit unions because of increased use of ATM's, online banking, and other technology that reduces the need for tellers.
Barbers	There will be a small decrease in beauty shops because of growth in specialized services, such as manicures and massages.
Bartenders	Small to moderate decreases are projected for bartenders in all industries, as competition leads to a reduction in specialized positions. In hotels, contracting out for these services also will reduce demand.
Bicycle repairers	Bicycling for exercise and sport remains popular; the need to maintain and repair often expensive equipment will lead to a small increase in miscellaneous shopping goods stores.
Bill and account collectors	There will be small increases for all industries except mortgage bankers and brokers, as more purchases are made on credit and companies attempt collection of unpaid debt. A moderate decrease is projected in mortgage bankers and brokers due to increased outsourcing of this function. Also, the loan processing function will become more efficient as it becomes concentrated in a few large companies.
Billing and posting clerks and machine operators	There will be a large decrease in wholesale trade and moderate decreases in all other industries as computers are increasingly used to automate billing and posting functions.
Billing, cost, and rate clerks	A moderate decrease in wholesale trade and transportation results from increased use of computers and the Internet to track and bill customers.
Boiler operators and tenders, low pressure	Small decreases are expected in all industries, because of growth in the use of automatic boiler systems for heating buildings and high efficiency boilers for industrial use.
Bookbinders	Moderate decreases are projected across all industries due to new technology that performs finishing operations, permitting more in-house production.
Bookkeeping, accounting, and auditing clerks	Moderate decreases are expected because of the implementation of automated accounting systems and the consolidation of many recordkeeping jobs.
Bricklayers, blockmasons, and stonemasons	There will be a small increase in masonry and stonework due to increased variety of materials used, including lighter insulated panels used in skyscraper construction.
Brokerage clerks	A moderate increase is expected in commercial banks, savings institutions, and credit unions as banks enter the securities market. Small decreases are projected for all other industries because of growth of online trading and automation of clerical tasks.
Brokers, real estate	There will be a small decrease in estate agencies as the Internet allows buyers to obtain information without a broker.
Bus and truck mechanics and diesel engine specialists	A small decrease is expected in motor vehicles, parts, and supplies because the demand for gasoline engines is growing faster than the demand for diesel. A moderate decrease is projected for local Government, as outsourcing to private firms continues.
Bus drivers, transit and intercity	There will be a small increase in intercity buses, charter service, and terminals because of the increasing popularity of chartered interstate tours and custom trips.
Butchers and meatcutters	A moderate decrease is expected in grocery stores, as stores shift more processing to the manufacturers and substitute lower-skilled workers when possible. There will be a small decrease in meat products manufacturing, due to automation and the substitution of lower-skilled workers.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Cabinetmakers and bench carpenters	A large decrease is expected in household furniture manufacturing, as more furniture is machine cut from composition wood products and sold unassembled and unfinished, reducing the proportion of cabinetmakers and bench carpenters demanded in this industry. A moderate increase in furniture and home furnishings stores is expected, because of increasing relative demand for kitchen renovations in existing homes.
Camera and photographic equipment repairers	There will be a moderate decrease in motion picture production and distribution because of the use of more mechanically reliable videotape equipment.
Camera operators	Large decreases are expected as the use of digital image processing, which allows electronic transfer of data to printing plates, replaces the practice of photographing and developing film negatives.
Camera operators, television, motion picture, video	Digital technology and improvements in videotape quality, permitting broadcast from more remote sites, will result in moderate to large increases for camera operators.
Cannery workers	A small increase is expected in meat product manufacturing, because variations in product size make automation more difficult. There will be a moderate decrease in firms manufacturing preserved fruits and vegetables and a small decrease in miscellaneous foods, due to increased automation and efficiency.
Cardiovascular technologists and technicians	Increased incidence of coronary disease, coupled with the fact that the tasks performed by these technicians are not easily moved to outpatient settings, will result in a large increase in hospital jobs.
Carpet installers	A small decrease is expected as self-employed workers capture a larger proportion of the installation business.
Cashiers	There will be a small increase in many retail industries as firms seek to offer better customer service.
Cement and gluing machine operators and tenders	Moderate decreases are projected for all industries due to faster and more automated gluing machines.
Central office and PBX installers and repairers	A small increase will occur in telephone communications as telecommunications companies strengthen their infrastructure to provide high bandwidth communications. The installation and ongoing maintenance of computerized switching equipment will boost the relative demand for these workers.
Central office operators	There will be a large decrease expected in telephone communications as positions are eliminated due to new technologies, such as voice recognition and the Internet.
Chemical engineers	Small to moderate increases are projected in electronic components and accessories; pulp, paper, and paperboard mills; and research and testing services because of the demand for improved chemicals and materials, and environmental, health, and legal concerns that continue to spur testing and research.
Chemical equipment controllers, operators and tenders	There will be a large increases in industrial organic chemicals and plastics materials and synthetics because of industry-wide increases in productivity that are reducing the number of production workers, except those directly operating the equipment.
Chemists	A moderate increase is expected in research and testing services as a wealthier and more diverse population demands new and improved products, and as chemical manufacturing firms contract out for research and development. Small decreases throughout most of chemical manufacturing (except drugs) are projected because of outsourcing trends.
Chiropractors	There will be a small increase in offices of other health practitioners as the popularity of alternative care grows.
Civil engineers	Small increases are expected in most industries, except Government, because of increased demand for building and infrastructure capacity and environmental and safety awareness.
Cleaners of vehicles and equipment	A moderate decrease is projected for air carriers due to a shift from hand washing to more efficient power spraying of planes. In automotive services, except repair, a small decrease is expected because of slower growth in car washes relative to other sectors of this industry, such as automotive lubricating services. There will be a moderate increases in the

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
	automotive rental and repair industries, as consumers demand more car washes from the providers of these services.
Clinical laboratory technologists and technicians	A small shift in demand from hospitals to medical and dental laboratories will occur as hospitals continue to contract out for laboratory services.
Coating, painting, and spraying machine operators, tenders, setters, and set-up operators	A small increase is expected for these skilled workers in most industries because their jobs are not easily automated.
Coin, vending, and amusement machine servicers and repairers	There will be a moderate decrease in nonstore retailers and in beverages because better technology makes machine repair less labor intensive. However, a moderate increase in grocery and related products is expected because the distribution of candy, chewing gum, soda, and potato chips is growing faster than other segments of this industry.
Combination machine tool setters, set-up operators, operators, and tenders, metal and plastic	There will be small increases in all industries, except Federal Government, due to employers' demand for greater flexibility and the need for workers to operate a variety of machine tools. A moderate decrease in the Federal Government is projected due to continued contracting out of this function.
Communication, transportation, and operations managers	There will be a small increase in telephone communications due to the increased need for managers to oversee telecommunications projects to increase capacity.
Compositors and typesetters, precision	Very large decreases in most industries due to the replacement of traditional typesetting and composition services with electronic composition processes, such as desktop publishing.
Computer engineers	Projections include a very large increase in computer and data processing services, a moderate increase in the Federal Government, and small to moderate increases in most other industries. Increases will result from the fast pace of technological change and continuing demand for new and improved applications.
Computer operators, except peripheral equipment	Large to very large decreases are expected in almost all industries due to advances in technology and system automation, eliminating the need for numerous computer operators to run mainframe systems. In addition, functions previously performed by computer operators are increasingly being done by other computer workers.
Computer programmers	Small to moderate decreases are projected for almost all industries. Although establishments still need programmers to write and modify programs and maintain old code, emphasis on development and analysis is boosting demand for computer engineers and developers relative to programmers.
Computer support specialists	There will be a very large increase in computer and data processing services and large increases for most other industries as computer use grows and as systems become more sophisticated, requiring more technical support.
Conservation scientists and foresters	Continuing emphasis on environmental protection and responsible land management will result in moderate increases in State and local government and in research and testing services.
Construction managers	Regulations concerning energy use, environmental impact, and health continue to affect the complexity of construction projects, resulting in a small increase in nonresidential building construction.
Cooking and roasting machine operators and tenders, food and tobacco	There will be a small decrease in all industries, resulting from increased automation.
Cooks, institution or cafeteria	Small to moderate decreases are expected in most industries, including hospitals, nursing homes, and schools, as establishments contract out this work.
Cooks, restaurant	A small decrease is projected for hotels and motels, because such establishments will be less likely to own and operate restaurants and dining areas.
Correctional officers and jailers	Moderate to large increases are expected throughout the economy as prison populations increase.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Correspondence clerks	Small decreases are expected as notification of delinquent accounts and bills due is increasingly automated.
Cost estimators	Small increases are projected for heavy construction and plumbing, heating, and air-conditioning establishments as construction projects become more complex, spurring the need for specialized estimates to aid in bidding and costing of projects.
Counter and rental clerks	There will be a small increase for car rentals and a moderate increase for miscellaneous amusement and recreation services and bowling centers as firms seek to offer better customer service.
Couriers and messengers	The use of facsimile transmissions and e-mail will continue to reduce the need for couriers and messengers, resulting in small decreases in all industries.
Court reporters, medical transcriptionists, and stenographers	A small increase is expected in offices of physicians because of the growing use of medical transcriptionists. There will be a small increase in mailing, reproduction, and stenographic services because more firms are contracting out rather than keeping stenographers on staff. Moderate decreases are projected for other industries because the use of dictation machines, personal computers, and audio recording equipment will reduce demand for stenographers.
Credit authorizers	Small decreases are expected in all industries as credit ratings become easier to evaluate and the process becomes increasingly automated.
Credit checkers	New software that makes checking credit ratings faster and easier will result in moderate decreases in all industries except mortgage bankers and brokers and personnel supply services. There, demand will remain constant due to the offering of more financial services by mortage banking firms and increased outsourcing of credit checking to temporary workers in personnel supply services.
Crossing guards	There will be a small decrease because low pay, split shifts, and short hours make this job unattractive, and because unpaid volunteers increasingly fill these positions.
Custom tailors and sewers	Moderate to large decreases are projected as more customers opt for off-the-rack, casual clothing, which requires little custom tailoring.
Cutters and trimmers, hand	Large increases in household furniture are projected because hand trimmers perform vital inspection and repair work, which is difficult to automate relative to other jobs in this industry.
Cutting and slicing machine setters, operators and tenders	There will be a large increase in meat products manufacturing, because of increased processing at the manufacturing level and increased demand for processed and sliced meats.
Dairy processing equipment operators, including setters	A small decrease is expected in food manufacturing, resulting from increased efficiency of milk processing machines.
Dancers and choreographers	There will be a small increase in jobs with producers, orchestras, and entertainers, as dance grows in popularity.
Data entry keyers	Small decreases are projected because of new technologies, such as scanners, that automate the data entry process.
Data processing equipment repairers	Small to moderate decreases are expected in wholesale trade and computer and data processing services. General purpose customer service workers will continue to replace repair specialists as repairs are simplified.
Database administrators	There will be a small increase in most industries, but a much larger one in computer and data processing services, where a very large increase in demand is expected. In computer service firms, database administrators will be needed to coordinate changes to, test, and implement computer databases; and to plan and coordinate security measures on a contract basis for other industries.
Dental assistants	Dentists will delegate more tasks to assistants in order to lower costs and increase productivity, resulting in a small increase in jobs in dentist offices.
Dental hygienists	Dentists will continue to delegate more tasks to hygienists to meet the growing demand for dental services, resulting in a small increase in offices of dentists.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Dental laboratory technicians, precision	A moderate decrease is expected in medical and dental laboratories as technological improvements increase productivity. There will be a large decrease in offices of dentists as offices contract out more of this work.
Dentists	A small decrease is expected as more dental services are provided by support staff rather than dentists.
Designers, except interior designers	As business environments become more competitive, product design will become more important, leading to small to moderate increases in demand for these occupations. Within apparel, a very large increase is expected as more production work moves offshore and the designer's share of this industry expands.
Desktop publishing specialists	Very large increases are expected in most industries as desktop publishing specialists, using computer technology, replace traditional compositors, typesetters, and paste-up workers.
Detectives and criminal investigators	Small to moderate increases will be generated by growing public demand for better protection from crime.
Dietitians and nutritionists	Nursing homes will continue to contract out for these services, or will use lower-level personnel when possible, resulting in a small decrease. A small increase is expected in offices of physicians because of an increasing focus by physicians on preventive health care.
Dining room and cafeteria attendants and bar helpers	Small to moderate decreases are projected for workers in most industries, due to increasing automation, substitution of other workers, and contracting out. There will be a small increases in nursing homes and residential care facilities, because of increasing demand for specialized diets and an emphasis on service.
Directors, religious activities and education	Expansion of social, educational, religious, and recreational activities will lead to a small increase in religious organizations.
Directory assistance operators	There will be a very large decrease in telephone communications due to the adoption of new technologies, such as voice recognition and the Internet, that will allow callers to access phone numbers without speaking to an operator.
Dispatchers, except police, fire, and ambulance	A small decrease is expected in telephone communications because more installers and repairers are using pagers and cell phones to be routed to customers.
Drafters	Small decreases are projected for all industries except personnel supply services, because laborsaving computer design and drafting software allows other workers to produce work formerly done exclusively by drafters. A large increase in personnel supply services results from a growing trend of using drafters on a temporary basis.
Drilling and boring machine tool setters and set-up operators, metal and plastic	Introduction of computer numerically-controlled (CNC) machine tools will lead to declines in the use of manual drilling machines, resulting in moderate job decreases in all industries.
Driver/sales workers	Small to moderate decreases are expected in most industries because of the general trend away from the employment of drivers who also sell products.
Duplicating, mail, and other office machine operators	Large decreases are projected across most industries as advancements in duplicating, mail, and office machines improve worker productivity.
Economists and marketing research analysts	There will be a small increase in the establishments of security and commodity brokers and dealers as they increasingly use these workers to conduct industry and business analyses to aid investment decisions.
EKG technicians	Moderate to large decreases are projected for offices of physicians and hospitals, as other medical staff are trained to perform this specialized task.
Electrical and electronic assemblers	Small to moderate increases in the industries manufacturing products such as household audio and video equipment, communications equipment, and miscellaneous electrical equipment and supplies, as work is restructured to use a higher proportion of less-skilled assemblers.
Electrical and electronic equipment assemblers, precision	Because precision assembly is difficult to automate, there will be small increases for these workers in the electronic components and accessories and the miscellaneous electrical equipment and supply sectors.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Electrical and electronic technicians and technologists	Moderate increase in personnel supply services is expected as these technicians increasingly are hired as contract workers. There will be a moderate decrease in research and testing services as computers boost productivity.
Electrical and electronics engineers	Moderate to large increases are expected in most industries due to an increase in demand for security, navigation, communications, and safety equipment, as well as avionics and guidance systems research.
Electrical powerline installers and repairers	A very large increase is expected in heavy construction, as this industry increasingly provides contract labor to electrical power companies seeking to contain costs because of deregulation.
Electromechanical equipment assemblers, precision	There will be a moderate decrease in the computer and office equipment sector, as production activities move to offshore locations. A small increase occurs in the measuring and controlling devices sector, due to rapid growth in the production of devices with electromechanical components.
Electroneurodiagnostic technologists	There is a small decrease in hospitals, which are cross-training other staff to perform electroneurodiagnostic tasks. Additionally, technological advances will increase productivity.
Electronic home entertainment equipment repairers	Large decreases will occur in appliance, radio, TV, and music stores and in electrical repair shops due to lower maintenance requirements of equipment with microelectronic circuitry. Also, as equipment becomes more affordable, breakdowns are more likely to result in replacement rather than repair.
Electronic semiconductor processors	A moderate increase in electronic components and accessories will occur as intense competition for semiconductor market share translates into a higher proportion of electronic semiconductor processors.
Electronics repairers, commercial and industrial equipment	Small increases are projected for private industries as businesses install electronic equipment to automate a variety of functions, including assembly and testing. A moderate decrease is expected as the Federal Government contracts out these functions.
Emergency medical technicians and paramedics	A large increase will occur as hospitals transfer patients to outpatient facilities themselves.
Employment interviewers, private or public employment service	There will be a small decrease in State Government because one-stop job centers are consolidating interviewing functions under other job titles.
Engineering, natural science, and computer and information systems managers	Moderate to large increases are projected across almost all industries as firms expand management to keep up with growing computer workforces and technical consulting services.
Excavation and loading machine operators	Increasing population, urbanization, and development will result in large job increases in highway, street, and heavy construction.
Extruding and forming machine operators and tenders, synthetic or glass fibers	Moderate to large increases are expected in most industries as the demand for synthetic and glass fibers grows.
Fallers and buckers	Mechanization of logging operations and more efficient equipment will continue to result in a small job decrease.
Farm managers	Small increases in crops, livestock and livestock products are projected as the trend toward larger farms and a growing corporate presence in the agricultural sector leads to more jobs for managers relative to other workers.
File clerks	Automation and consolidation of recordkeeping functions will result in small decreases in most industries. In offices of physicians, productivity gains due to automation will be counteracted by a growing volume of paperwork, leading to a small increase.
Film strippers, printing	There will be large decreases in most industries as the cutting, arranging, and taping of negatives onto layout sheets to produce printing plates is increasingly done using computer technology.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Fishers	A small decrease is projected as a result of fishing restrictions.
Fitters, structural metal, precision	Moderate to large decreases are expected in miscellaneous special trade contractors and fabricated structural metal products because of improvements in production processes and structural metal products.
Flight attendants	There will be a small increase as Federal laws keep employment of flight attendants relative to passengers constant.
Food counter, fountain, and related workers	Moderate increases are expected in grocery stores and hotels due to increased demand for prepared foods. Small decreases will occur in most other industries, as a result of automation, consolidation, and contracting out.
Food preparation workers	There is a small increase in grocery stores, due to growth in demand for prepared foods. Small to moderate decreases are expected in most other industries, as establishments such as schools, hospitals, and nursing homes contract out this work.
Food service and lodging managers	A small decrease is expected in hotels and motels, because these establishments will be less likely to own and operate restaurants and dining areas. A small increase will occur in education, due to increasing emphasis on quality meals for school-aged children, requiring increased oversight by managers.
Forest and conservation workers	There will be a small increase in forestry as timber tracts and forest nurseries become more numerous.
Freight, stock, and material movers, hand	Small to moderate decreases are projected for almost all industries due to automation and advances in moving machinery and equipment, such as computer-controlled lifting mechanisms. A small increase is expected in personnel supply services as an increasing number of temporary help agencies place hand material movers.
Furnace operators and tenders	Furnace operators and tenders are less affected by productivity gains than are other workers, leading to a small jobs increase in blast furnaces and basic steel products.
Furniture finishers	A large increase is expected in reupholstery and furniture repair due to increasing relative demand for these services. Moderate decreases are projected for office and miscellaneous furniture and fixtures manufacturing and furniture and homefurnishings stores due to increasing automation.
Gas and petroleum plant and system occupations	There will be a small increase in petroleum refining and in oil and gas field services, and a very large increase in crude petroleum, natural gas, and gas liquids. As the demand for other occupations in these industries weakens, these essential workers will make up an increasing share of industry employment.
Geologists, geophysicists, and oceanographers	Stronger environmental regulations will result in a small increase in engineering and architectural services. As exploration efforts slow, small decreases are expected in crude petroleum, natural gas, and gas liquids; oil and gas field services; and metal mining are expected.
Glaziers	There will be a moderate decrease in paint, glass, and wallpaper stores attributed to outsourcing to glass contractors.
Grinders and polishers, hand	Moderate to large decreases are projected for aircraft and ship building, as more efficient machinery replaces hand held tools. Small to moderate increases are expected in primary metal industries and stone, clay, and glass products due to increased demand for more highly finished products.
Grinding, lapping, and buffing machine tool setters and set-up operators, metal and plastic	More efficient production systems, such as cellular manufacturing, and greater use of computers and robotics will cause a moderate decrease in aircraft and parts and small decreases in all other industries.
Hand packers and packagers	A moderate decrease is projected for wholesale trade due to the continued introduction of automated material handling equipment, such as computer-controlled packaging mechanisms. In personnel supply services, a large increase is expected as a growing number of temporary help agencies place these workers.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Hard tile installers	Increased use of parquet and wood floors relative to hard tile will cause a moderate jobs decrease in carpentry and floor work.
Hazardous materials removal workers	There will be a small increase in electrical services from more facilities being decommissioned.
Head sawyers and sawing machine operators and tenders, setters and set-up operators	Very large decreases are expected in household furniture manufacturing as firms continue to automate sawing functions.
Heating, air conditioning, and refrigeration mechanics and installers	Small increases in all industries result from growing demand for retrofitting and energy efficiency.
Helpers, construction trades	In electrical work and electric services, moderate decreases will result from the introduction of technologies allowing skilled craft workers to assume more of the responsibilities of this lesser skilled occupation.
Home appliance and power tool repairers	As electronic equipment and appliances become more affordable, breakdowns are more likely to result in replacement rather than repair, moderately reducing the demand for repairers in appliance, radio, TV, and music stores. A small increase is projected for fuel dealers, as they increasingly sell large appliances and service contracts, and thus require more repairers.
Human resources assistants, except payroll and timekeeping	The growing use of computers and other office equipment in personnel departments will result in small decreases in all industries.
Human resources managers	A moderate increase is expected in labor organizations as standards regarding occupational safety and health, equal employment opportunities, health insurance, pension, family leave, and other benefits become more complex.
Human resources, training, and labor relations specialists	Small increases are projected for numerous industries, including the Federal Government, as legislation and court rulings continue to set new standards regarding occupational safety and health; equal employment opportunity; and health insurance, pension, family leave, and other benefits.
Industrial engineers, except safety engineers	Small to moderate decreases are expected in computer and office equipment, communications equipment, and measuring and controlling devices, because productivity enhancement programs are mature in these industries, lowering demand for industrial engineers relative to production workers. There will be small increases in aircraft and parts and motor vehicles and equipment , industries in which competition spurs productivity and quality control programs.
Industrial machinery mechanics	Small to large increases are expected, especially in industries manufacturing motor vehicles, food, and textiles, because of the growing amount of automated industrial equipment to install, maintain, and repair.
Industrial production managers	There will be small decreases in electronic components and accessories because of foreign outsourcing of production, as well as automation of production processes and organizational restructuring.
Industrial truck and tractor operators	Computer-controlled conveyor systems, overhead handling systems, and automated vehicles that do not require operators are replacing industrial truck and tractor operators in public warehousing and storage, resulting in small decreases. The trend toward large outlet stores and market warehouses means a small increase for operators in grocery and related products.
Inspectors, testers, and graders, precision	Small to very large decreases are expected throughout manufacturing due to the introduction of automated inspection technologies and the shift of inspection duties to production workers. The contracting out of this function and the use of temporary help will result in small to moderate increases in personnel supply and research and testing services.
Institutional cleaning supervisors	Small to very large decreases are projected for most industries, as the average number of workers per supervisor continues to rise and as establishments increasingly contract out for janitorial services.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Instructors and coaches, sports and physical training	There will be a small increase in miscellaneous amusement and recreation services, as more adults and children participate in formal physical fitness activities.
Insulation workers	A moderate decrease is expected in masonry, stonework, and plastering as more builders use specialty contractors to do insulation work. This will lead to a concomitant increase in miscellaneous special contractors.
Insurance adjusters, examiners, and investigators	A small increase in property and casualty insurance occurs because the interpersonal communication required to resolve claims makes automation difficult.
Insurance appraisers, auto damage	Small increases are projected for property and casualty insurance and insurance agents, brokers, and services, reflecting the difficulty of automating this function.
Insurance claims clerks	There is a small increase in insurance agents, brokers, and services as claims processing firms grow relative to insurance agencies due to increased outsourcing of this function by medical facilities.
Insurance policy processing clerks	Small decreases are expected in all industries, except insurance agents, brokers, and services due to increasing automation of this clerical task.
Insurance sales agents	Reductions of clerical staff due to automation and consolidation will result in a small increase in insurance agents, brokers, and services. A very large increase is projected for commercial banks, savings institutions, and credit unions as barriers that prevent these establishments from selling insurance fall. Alternative means of distribution, such as direct mail, telemarketing, and the Internet, will cause a moderate decrease in life insurance.
Insurance underwriters	There will be a small decrease in property and casualty insurance due to automation. Moderate increases are expected in life, medical service, and health insurance, as underwriting functions return to the headquarters from agencies. This change is reflected in the large decrease in insurance agents, brokers, and service.
Interior designers	A small decrease occurs in department stores as they phase out internal design departments in favor of contract designers or smaller retailers. A small increase is expected in furniture and home furnishings stores because of growing demand for on-site design services.
Interviewing clerks, except personnel and social welfare	There is a small increase in hospitals due to the expanding role of the admissions staff, and a small decrease in research and testing as more surveys are conducted on the Internet.
Janitors and cleaners, including maids and housekeeping cleaners	A small decrease will occur in most industries, as firms contract out this work.
Jewelers and precious stone and metal workers	A moderate decrease is expected in miscellaneous shopping goods stores, due to increased competition from nontraditional sales sources such as the Internet.
Laborers, landscaping and groundskeeping	Small to moderate decreases are expected for real estate operators and lessors and private households, which are increasingly contracting out for landscape services rather than keeping laborers on payroll.
Landscape architects	A moderate decrease is expected in engineering and architectural services, as employment of landscape architects shifts from architectural firms to firms specializing in landscape architecture.
Lathe and turning machine tool setters and set-up operators, metal and plastic	Continued productivity increases from the use of computer numerically controlled (CNC) lathes and cellular manufacturing, coupled with greater demand for flexible workers, will result in small to moderate decreases in most industries.
Laundry and dry-cleaning machine operators and tenders, except pressing	Moderate to large decreases are projected for nursing homes, hospitals, and residential care facilities, as outsourcing of laundry and dry-cleaning services grows.
Lawn service managers	Small increases are expected for lawn service managers within landscape and horticultural services as small firms continue to merge with larger ones, contributing to a relative increase in lawn service managers.
Lawyers	There will be a small increase in State government and a large increase in the Federal Government because of growing caseloads in both State and Federal courts. A large increase

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
	is expected in property and casualty insurance, where insurance law and worker's compensation are growing areas, requiring more lawyers relative to other occupations.
Legal secretaries	A small decrease in legal services is expected as paralegals increasingly handle many of the tasks traditionally assigned to legal secretaries.
Letterpress operators	Large decreases in most industries because new technology, such as desktop publishing software and high quality printers, will permit in-house production.
Licensed practical and licensed vocational nurses	A moderate decrease is expected in hospitals as these workers are replaced by a combination of more highly skilled registered nurses and lower-level nursing aides.
Loan and credit clerks	Small decreases will occur in most industries due to automation of loan processing.
Loan counselors and officers	There will be a small increase in commercial banks, savings institutions, and credit unions; and mortgage bankers and brokers because of growth in the number and complexity of loans and decreases in clerical staff that occur because of automation.
Loan interviewers	Large decreases are expected in all industries, as the loan process becomes increasingly standardized and a simpler credit scoring system further reduces the need for follow-up interviews to resolve problems.
Locomotive engineers	Automation and other technical advances in railroad transportation will continue to increase productivity of labor-intensive occupations such as brake and signal operators, leading to a large increase for engineers relative to other workers.
Logging equipment operators	There will be a small increase in logging as these operators perform a variety of tasks formerly done manually.
Machine assemblers	Because of changes in product mix, small to moderate increases are expected in the industries manufacture refrigeration and service machinery, and motor vehicles and equipment.
Machine builders and other precision machine assemblers	Because precision assembly work is difficult to automate, small to very large increases are expected in the manufacturing of construction, general industrial, and refrigeration machinery, as well as medical instruments and supplies.
Machine feeders and offbearers	Small decreases are expected in several manufacturing industries due to increasing automation. A small increase in the meat products industry will occur because the processing of these products is more difficult to automate due to variations in product size, weight, and quality.
Machine forming operators and tenders, metal and plastic	Computer-assisted casting and molding machines and shopfloor reorganization will continue to increase productivity and efficiency, resulting in moderate to large decreases in all industries except rubber products and plastic hose and footwear, which is already highly automated, and personnel supply services, where demand for workers is expected to remain constant.
Machine tool cutting operators and tenders, metal and plastic	Moderate decreases are projected for all industries, as the use of computer numerically controlled (CNC) cutting machines and shopfloor reorganization boost productivity.
Mail clerks, except mail machine operators and postal service	There will be a moderate decrease in Federal Government, stemming from automated mail processing and growing use of e-mail to distribute documents.
Maintenance repairers, General utility	Small to moderate increases are expected in a number of industries due to growth in the number of buildings containing equipment needing maintenance and repair. The relative demand for repairers skilled in many different crafts will increase in establishments such as schools, restaurants, real estate operators and managers, and churches.
Management analysts	Moderate increases are expected in most industries as more firms use these workers to boost efficiency and deal with mergers, technology, and regulatory changes. The Federal Government will moderately expand its use of management consultants as services are increasingly contracted out or privatized.
Manicurists	Beauty shops continue to add specialized services in addition to hair care, resulting in a small increase for manicurists.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Marketing sales worker supervisors	A small increase is expected for many retail trade and service industries, due to need to supervise more cashiers, retail salespersons, and counter and rental clerks.
Materials engineers	Small increases are projected for blast furnaces and basic steel products, and for aircraft and parts, because of the increased demand for stronger and lighter-tempered steels and the growing use of composite materials in building aircraft.
Meat, poultry, and fish cutters and trimmers, hand	There will be a small increase in meat products manufacturing, as processing shifts to manufacturers. Firms will substitute these workers for more highly skilled butchers and meat cutters.
Mechanical engineers	A moderate decrease is expected in engines and turbines, where computers continue to increase productivity in design and testing.
Medical and health services managers	Increasing complexity of hospitals and large health networks will result in a small increase in hospitals. A moderate increase occurs in offices of physicians because of a trend toward larger office staffs.
Medical assistants	There will be a small increase in offices of physicians due to the proliferation of group practices that employ a higher proportion of support workers, including medical assistants who can handle both clinical and clerical duties. A moderate increase is expected in offices of other health practitioners, as practitioners delegate more low-level duties. A large increase will occur in hospitals, as ambulatory and outpatient departments continue to grow rapidly.
Medical records and health information technicians	Greater insurance company requirements and third-party reimbursement issues will result in a large increase in offices of physicians. However, in hospitals, these factors will be tempered by mergers and downsizing to result in only a small increase.
Millwrights	Automation of machinery and technological advances will result in large decreases in steel and motor vehicle manufacturing. A moderate increase in miscellaneous special trade contractors is expected, as firms contract out machinery installation.
Mining, quarrying, and tunneling occupations	Moderate decreases are projected for coal mining and for nonmetallic minerals, except fuels, because these occupations are less affected by technological advancements than other occupations in the industry.
Mobile heavy equipment mechanics	As more construction companies lease or rent, rather than purchase, heavy equipment, the burden of equipment upkeep will shift to the lessors, leading to a large increase in the demand for mechanics in miscellaneous equipment rental and leasing.
Motion picture projectionists	There will be a large decrease in motion picture theaters, as larger multiplexes with new technology replace older theaters.
Musical instrument repairers and tuners	Purchases of appliances, radios, and televisions continue to outpace purchases of musical instruments. Therefore, a moderate decrease for musical instrument repairers is expected in appliance, radio, TV, and music stores.
Musicians, singers, and related workers	There will be a small decrease in jobs with producers, orchestras, and entertainers, and eating and drinking places resulting from increased use of electronic and prerecorded sounds. A small increase in religious organizations occurs due to growth in professional choirs.
New accounts clerks, banking	A small increase is expected in commercial banks, savings institutions, and credit unions as these workers replace bank tellers in branch offices and answer a variety of customer service questions in call centers.
Numerical control machine tool operators and tenders, metal and plastic	Moderate increases are projected for all industries, except construction and related machinery, due to a shift from the use of manual machine tools to computer numerically controlled (CNC) tools.
Numerical control machine tool programmers	There will be a small increase in metalworking machinery as these skilled workers maintain employment in declining industries.
Occupational therapists	As more children with disabilities attend school, there will be a large jobs increase in education. A small increase takes place in home health care services to meet the increased needs of an aging population.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Occupational therapy assistants and aides	Offices of other health care practitioners, nursing homes, and hospitals are increasingly using assistants and aides rather than occupational therapists to keep costs down. Thus, small increases in demand for assistants and aides are expected.
Office clerks, general	A small decrease is expected in personnel supply services as professional workers make up an increasing share of all contract workers. Small increases are projected across most industries as consolidation of clerical tasks increases the proportion of general office help relative to specialized clerical employees.
Office machine and cash register servicers	A small increase is expected in wholesale trade, as office machinery becomes more varied and sophisticated. Small to moderate decreases are projected for most other industries as demand for computer repairers outpaces demand for office machinery repairers in general industry.
Offset lithographic press operators	There will be a moderate decrease as computerized presses, which allow press operators to perform many tasks electronically, increase productivity.
Ophthalmic laboratory technicians	Faster growth in other retail sectors and increased automation will result in a large decrease in used merchandise and retail stores, n.e.c. Despite increased automation, more prescription and optical lenses are being produced domestically, resulting in a small increase in wholesale trade.
Opticians, dispensing	Moderate decreases are expected in offices of other health practitioners and in used merchandise and retail stores, n.e.c., as other sectors of these industries grow faster than those that employ opticians. A very large increase is projected for department stores as more stores offer eyewear services.
Optometrists	Increased productivity and laser vision correction will result in a moderate decrease in offices of other health practitioners.
Order clerks	As the spread of electronic data interchange, e-commerce, and automatic billing systems increases productivity, a small decrease will result in all industries.
Painters and paperhangers	There will be a moderate increase in residential building construction, reflecting a lack of advances in labor-saving technology compared to the rest of the industry.
Painting, coating, and decorating workers, hand	A large increase is expected in the stone, clay, and miscellaneous mineral products industry, due to increasing demand for hand-painted tiles and other products. A large decrease is projected for the household furniture industry, reflecting continued gains in market share of lower-priced furniture that requires less hand decorating.
Paper goods machine setters and set-up operators	Productivity gains through automation will result in moderate decreases in miscellaneous converted paper products.
Paralegals and legal assistants	Large increases are expected throughout most industries as law firms and other employers with legal staffs increasingly hire paralegals to lower costs and increase the availability and efficiency of legal services.
Parking lot attendants	There will be a large increase in miscellaneous personal services due to growth in contract valet parking. The proportion of attendants in commercial sports will decline steeply as sports facilities contract out parking operations.
Parts salespersons	Small to moderate decreases are projected for retail and wholesale trade industries due to automation and increased use of electronic data interchange, e-commerce, and the Internet.
Paste-up workers	Very large decreases are expected as technology enables other workers to perform paste-up duties using electronic typesetting, desktop publishing, and graphics software.
Patternmakers and layout workers, fabric and apparel	Although many apparel jobs are moving offshore, patternmakers and layout workers will continue to lay out and cut fabric in the United States, resulting in a very large increase in the apparel industry.
Payroll and timekeeping clerks	Automation, such as new computer software that easily tracks payroll, and further consolidation of recordkeeping functions will result in moderate decreases in all industries.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Peripheral equipment operators	Labor-saving automation and advances in robotics will lead to large or very large decreases across all industries. Many tasks previously performed by these workers have been taken over by computer operators or other personnel.
Personal and home care aides	The demand for low cost labor and more accessible care in the home will drive a very large increase in the use of these workers in hospitals.
Petroleum engineers	Moderate decreases are projected as firms focus on recovering oil from known sites, which requires less research and development. In addition, advances in software packages for mapping and analyzing geological composition should increase the productivity of petroleum engineers.
Pharmacists	Increased automation and delegation of some duties to pharmacy technicians taking on more duties will result in a small decrease in drug and proprietary grocery stores. Moderate increases are expected in department and grocery stores as these retailers continue to incorporate pharmacy departments. A moderate increase will take place in nonstore retailers as the volume of Internet and mail-order drug purchases increases.
Pharmacy aides	Small increase in all industries, except hospitals, as pharmacy aides assume more of the routine duties formerly done by pharmacists.
Pharmacy technicians	A large increase is expected within grocery and department stores as these establishments add pharmacy departments. There will be a moderate increase for nonstore retailers, and small increases in wholesale trade and in the Federal Government. Pharmacy technicians will handle more customer distribution duties.
Photoengravers	Photoengraving, traditionally done by hand using chemicals and dyes, will continue to be replaced with new technology using computers, scanners, and digital processing, leading to very large decreases for these workers.
Photoengravers and lithographic machine operators and tenders	There will be a very large decrease in mailing, reproduction, and stenographic services and moderate decreases in most other industries as a process that was once accomplished using chemicals and dyes is increasingly done using computers, scanners, and digital processing.
Photographers	The growing use of digital photography will allow more photo coverage and coverage from more locations, leading to a large increase in miscellaneous business services, which includes wire services and news syndicates, and a small increase in radio and television broadcasting.
Photographic process workers, precision	Small to moderate decreases are expected as digital imaging equipment, Advanced Photographic Systems (APS), and desktop office systems become more common, making these workers more productive and enabling customers to do their own precision processing.
Photographic processing machine operators and tenders	Large decreases reflect the growing use of electronic and digital photo-processing equipment, which will allow for more and faster in-house processing capabilities, dampening the need for machine operators and tenders.
Physical therapists	There will be a small increase in home health care services due to the increased use of outpatient care.
Physical therapy assistants and aides	Cost cutting measures will result in a small increase in offices of other health practitioners, nursing homes, and hospitals. These establishments will continue to use more aides relative to physical therapists and other more costly medical staff
Physician assistants	There will be a small increase in offices of physicians and a large increase in hospitals, because they will provide more of the hands-on care formerly provided by physicians.
Physicians	A small increase is projected for hospitals because new physicians are more likely to work as salaried employees of hospitals or large health networks than to establish office-based solo practices.
Physicists and astronomers	A small decrease in research and testing services is expected as other occupations grow more quickly because of increasing demand for applied research, product development, and analytical testing relative to basic physics research.

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Plasterers and stucco masons	A small increase will occur in masonry, stonework, and plastering, reflecting the increased use of plaster and plaster-like products relative to drywall.
Plastic molding machine setters, set-up operators, operators, and tenders	There will be a moderate increase in rubber products and plastic hose and footwear as other occupations become more automated, and a moderate increase in motor vehicles and equipment as a greater proportion of automobiles are made of plastic.
Plumbers, pipefitters, and steamfitters	Small to moderate decreases are projected because the growing use of plastic pipes will continue to reduce the need for frequent repairs.
Podiatrists	There will be a small decrease in offices of other health practitioners due to cost cutting pressures and substitution of services from other providers, such as physical therapists.
Police and detective supervisors	Small increases will result from growing public demand for better protection from crime.
Police patrol officers	Small to large increases are projected across all government sectors due to demand for better protection from crime.
Power distributors and dispatchers	Deregulation, along with increasing competition and automation that spurs technical innovation, will result in small decreases in electric services and in local Government.
Power generating and reactor plant operators	There will be a small to moderate increase in electric services and combination utility services, as personnel reclassification shifts workers to this occupation. A moderate increase is projected for in combination utility services. A moderate increase in water supply and sanitary services will take place as more new plants install their own power plants.
Precision instrument repairers	Small to moderate decreases are expected in Federal Government and blast furnace and basic steel products, as precision repair work is outsourced. The miscellaneous repair shops industry will experience a moderate increase because new, sophisticated equipment requires precision instrument repairers.
Pressers, hand	Large decreases are projected for apparel because of new pressing technologies and the movement of jobs abroad. There will be a small increase in laundry, cleaning, and garment services because automation is difficult in small shops.
Pressing machine operators and tenders, textile, garment, and related materials	Productivity gains due to automated pressing will result in moderate to large decreases in most industries except laundry, cleaning, and garment services, where small shops are less likely to use new technology.
Private detectives and investigators	Businesses are increasingly contracting with security firms or law enforcement officers these services, resulting in small decreases in many industries.
Procurement clerks	Moderate decreases are expected in most industries as inventory control and automated ordering processes (via the Internet or facsimile machines) foster efficiency.
Production, planning, and expediting clerks	Small decreases are projected as manufacturing industries increasingly use automatic data storage and retrieval systems and just-in-time manufacturing to reduce the need for extended planning services.
Proofreaders and copy markers	Moderate to large decreases are expected in all industries, as automated proofreading programs allow authors and writers to quickly proof their own work for spelling, grammar, and graphics errors.
Property, real estate, and community association managers	There will be a small increase in real estate agencies, as professional management firms replace owner-operators.
Psychiatric aides	A small decrease will occur in hospitals due to cost pressures limiting inpatient psychiatric treatment.
Psychiatric technicians	A small decrease will occur in hospitals due to cost pressures limiting inpatient psychiatric treatment.
Psychologists	Expanded services, including testing, for students will result in a small increase in education-related jobs. There will be a moderate decrease in hospitals, as hospitals prefer psychiatrists to treat patients because of their ability to prescribe drugs. A small decrease will take place in offices of other health practitioners as a result of managed care cost constraints. A small

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
	decrease is expected in social service agencies because establishments providing psychological counseling will grow more slowly than other establishments in this industry.
Public relations specialists	Small increases are projected in labor and membership organizations as increasingly competitive business environments spur demand for these specialists.
Punching machine setters and set-up operators, metal and plastic	Implementation of robotics and computer numerically controlled (CNC) machine tools will result in moderate decreases in all industries, except metal forging and stamping, in which the number of jobs is expected to remain constant.
Purchasing agents and buyers, farm	Technology, mergers, and supply-chain efficiencies will result in a small decrease in all industries.
Purchasing agents, except wholesale, retail, and farm products	There will be a small increase in government sectors as these workers administer a growing number of government outsourcing programs.
Purchasing managers	Advanced technology, consolidation, and supply-chain efficiencies will cause a small decrease in most wholesale and retail trade industries.
Radio mechanics	There is a small increase in telephone communications due to fast growth in the wireless sector of the industry. A large decrease in electrical repair shops is expected, as equipment becomes more reliable and easier to repair. As equipment prices decline, defective equipment is often replaced instead of repaired.
Radiologic technologists and technicians	Outsourcing will result in a small decrease in offices of physicians. A large increase in medical and dental laboratories will take place because of outsourcing.
Railroad brake, signal, and switch operators	A large decrease in railroad transportation will result from technological advances and cost-cutting.
Receptionists and information clerks	Moderate decreases are expected in offices of physicians, dentists, and other health practitioners because of the trend toward larger group practices, in which many practitioners share the services of one receptionist.
Recreation workers	There will be a small increase in civic and social associations, resulting from fast growth in participatory sports. Small decreases are projected in nursing homes, residential care facilities, and social service agencies, due to cost constraints and increased contracting out of recreation services.
Recreational therapists	Cost cutting will result in a large decrease in nursing homes.
Refuse and recyclable material collectors	A small increase is expected in local and long-distance trucking and terminals due to increased contracting out by local Governments. Water supply and sanitary services, as well as the local Government, will experience small to large decreases as transportation functions shift to private contractors.
Registered nurses	There will be a small increase in nursing and personal care facilities, as nursing home residents require more extensive and skilled care. A small increase is expected in education, as school systems provide more health services to students, including those who are disabled.
Reservation and transportation ticket agents and travel clerks	Small to moderate decreases are projected for most industries, including air carriers and membership organizations, because of increased use of new technologies, such as electronic ticketing and the Internet.
Respiratory therapists	Cost-cutting in nursing homes has caused a reduction in nonclinical services, leading to a large decrease for respiratory therapists. However, increased incidence of heart attacks and respiratory illnesses in an expanding population will result in a large increase in hospitals.
Retail salesperson	There will be a small increase in most retail industries, including department stores, as firms seek to offer better customer service.
Roustabouts, oil and gas	A large decrease is expected in crude petroleum, natural gas, and gas liquids due to technological improvements and outsourcing to oil and gas field services that, because of technology gains, will still have a moderate decrease.
Sales agents, real estate	A moderate decrease is projected for real estate agencies because of increased technology

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
	and outsourcing. This will be countered by a moderate jobs increase among real estate operators and lessors, where more independent contractors work and sales are growing.
Sales engineers	There will be a small increase in management and public relations due to increasing use of sales engineers as specialized consultants.
Science and mathematics technicians	A small increase in research and testing services is projected because of contracting out and expansion of the testing required for environmental assessments.
Secretaries, except legal and medical	Moderate decreases will occur in most industries as office automation, such as implementation of personal computers and interoffice e-mail, continues to redistribute traditional secretarial responsibilities to individual employees.
Securities, commodities, and financial services sales agents	There will be a small increase in security and commodity exchanges and services because of increased demand for financial planners and investment advisors relative to clerical staff. Deregulation will allow banks to offer more services, resulting in a very large increase in commercial banks, savings institutions, and credit unions.
Service station attendants	Moderate to very large decreases are expected in motor vehicle dealers, gasoline service stations, and petroleum and petroleum products due to increasing automation. Automotive services, except repair, will experience a moderate increase because of fast growth in establishments providing services, such as lubricating, previously provided in gas stations.
Sewers, hand	Small to moderate increases are projected for apparel and miscellaneous fabricated textile products, as automation continues to lower the demand for other occupations relative to hand sewers.
Sewing machine operators, garment	Small decreases will occur in most industries, reflecting the continued trend toward outsourcing as well as slight productivity gains from the implementation of faster machines and new manufacturing concepts.
Sheet metal workers and duct installers	There will be a moderate increase in plumbing, heating, and air conditioning because the air conditioning component of this industry is expected to grow faster than the plumbing and heating components, increasing the demand for sheet metal workers and duct installers relative to other workers. A very large decrease in aircraft and parts because of the growing use of composite materials in place of sheet metal. A moderate decrease is projected for the Federal Government, as it continues to outsource this work.
Sheriffs and deputy sheriffs	There will be a moderate increase in local governments as local law enforcement agencies increase in size.
Shipfitters	Small decrease is projected for the Federal Government as these jobs are increasingly contracted out.
Shipping, receiving, and traffic clerks	A small decrease in wholesale trade results from increased use of automation in warehouses, as well as just-in-time inventory control.
Shoe sewing machine operators and tenders	Growing imports, as well as continued movement of these jobs abroad, will result in very large decreases in all industries.
Social and human service assistants	There will be a large increase in social service agencies to accommodate managed care systems and the use of a team approach. Small increases are expected in State and local governments, as budgets allow the development of more social welfare programs. A moderate increase will occur in health and allied services, n.e.c, as assistants take on expanded duties. A large increase is projected for job training and related services due to efforts to reduce welfare rolls.
Social workers	There will be a small increase in offices of physicians because of growth in large group practices that can support more nonmedical personnel. A moderate increase will take place in nursing homes and hospitals to meet the needs of a growing elderly population and to provide discharge counseling to patients after shorter hospital stays. A large increase is projected in State Government due to budget surpluses. A small increase will occur in local government to permit it to meet the demand for social services.
Solderers and brazers	Small decreases will occur in most industries due to automation

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
Speech-language pathologists and audiologists	As students with disabilities are brought into mainstream schooling and special education programs expand, a large increase will occur in education. There will be a small increase in offices of other health practitioners because hospitals, schools, and nursing homes will increasingly outsource these services.
Statement clerks	Large decreases are projected for all industries, due to growing use of computers to process statements.
Station installers and repairers, telephone	A very large decrease is expected in telephone communications, because local phone companies are less likely to be responsible for equipment on customers' premises.
Stationary engineers	Automated systems and computerized controls will result in a moderate decrease in all industries.
Statistical clerks	Moderate decreases are expected because computers, which most professionals use as a tool, now do most statistical analyses.
Stock clerks and order fillers	The growing use of bar coding, hand-held scanners, computerized inventory control systems, and automated warehouse vehicles will result in moderate decreases in grocery stores, drug stores, and the Federal Government.
Structural and reinforcing metal workers	Productivity gains will result in small decreases in miscellaneous special trade contractors and heavy construction.
Surgical technologists	Surgical technologists will continue to be substituted for other medical personnel, such as surgical registered nurses, resulting in a moderate increase in hospitals. As more surgical procedures are moved to outpatient settings, a very large increase will occur in offices of physicians.
Surveying and mapping technicians	There will be a small decrease in State Government as these services are increasingly contracted out.
Surveyors, cartographers, and photogrammetrists	Small to moderate decreases are expected in all industries as a result of more productive technology. A small decrease is projected for local government as contracting out for these services becomes more common.
Switchboard operators	There will be a large decrease across almost all industries due to increasing use of new technologies, such as voice recognition and voice mail systems. No change or only a small decrease is expected in hospitals and hotels, due to the continued importance of providing live operators to patients and guests.
Systems analysts	Very large increases will occur throughout most industries as firms use systems analysts to plan reengineering efforts and apply the latest technologies to business applications.
Tax examiners, collectors, and revenue agents	Small increases are projected as tax collection and enforcement remain priorities even as other staff in the Federal Government are reduced.
Tax preparers	Small increases are expected as people looking for more affordable tax preparation turn to tax preparers as opposed to accountants.
Taxi drivers and chauffeurs	The prevalence of courtesy shuttles in hotels and other lodging places will result in a moderate increase.
Telephone and cable TV line installers and repairers	Moderate increases are projected for electrical work, and telephone communications as telecommunications and cable companies build up their networks to meet increasing demand for high bandwidth, high speed Internet access, and other services.
Textile bleaching and dyeing machine operators and tenders	There will be a moderate to large increases in apparel and in carpet and rug manufacturers because trade incentives continue to encourage the dyeing and cutting of apparel pieces in the United States.
Textile draw-out and winding machine operators and tenders	Small to large decreases are expected in most industries as this function is increasingly automated. A moderate increase will occur in apparel, as more textile production work is performed in-house.
Tire building machine operators	Demand for new tires on older vehicles and the labor-intensive nature of operating tire-

Table 5. Factors changing occupational utilization, 1998-2008—Continued

Matrix occupation	*Factors changing occupational utilization*
	building machines will result in a moderate increase is expected in the industry that produces tires and inner tubes.
Tire repairers and changers	A small decrease in auto and home supply stores is expected due to competition with repairers in department stores. There will be a large decrease in gasoline service stations as stations move away from offering tire and repair services, in favor of offering convenience store products.
Title examiners, abstractors, and searchers	Moderate decreases are expected because many of the tasks that once were handled by title examiners are now being assigned to legal assistants.
Travel agents	A small increase in membership organizations is expected, due to growth in membership travel clubs.
Truck drivers light and heavy	There will be a small increase in local and long-distance trucking and terminals and wholesale trade because of the increasing use of trucks as an intermediary between rail and air transportation and the end user.
Typesetters and composing machine operators and tenders	Very large decreases are expected in most industries because desktop publishing and graphics software will continue to replace traditional typesetting and composition work.
Upholsterers	Small to moderate decreases are projected for most industries as the growing use of more durable fabrics eliminates the need for reupholstering.
Ushers, lobby attendants, and ticket takers	There will be a small increase in motion picture theaters, as more of these workers are needed to assist disabled customers, address security concerns, and improve customer service.
Veterinary technologists and technicians	A small decrease is expected in veterinary services because relatively low wages will suppress entry into the occupation.
Waiters and waitresses	Moderate to large decreases will occur in almost all industries, except for restaurants. Firms such as hotels and motels will continue to contract out food services and replace restaurants with fast-food or self-service food outlets.
Watch repairers	A very large decrease is expected in miscellaneous shopping goods stores because the declining watch repair segment will represent a smaller share of this retail industry.
Water and liquid waste treatment plant and system operators	A small increase in water supply and sanitary services as they work to meet increased EPA regulations and the needs of a growing population.
Welders and cutters	There will be a small decreases in blast furnaces and basic steel products and in motor vehicles and equipment due to increased use of robotics and automation. Small increases are expected in fabricated metal structures, metal forgings and stampings, general industrial machinery, and ship and boat building and repairing along with moderate increase in construction and related machinery due to the difficulty of automating these functions.
Welding machine setters, operators, and tenders	Small increases are projected for most industries due to a shift from manual welding to machine welding for certain processes.
Welfare eligibility workers and interviewers	There will be a moderate decreases in all industries because welfare rolls are expected to continue to shrink.
Wholesale and retail buyers, except farm products	Small to moderate decreases are expected in most wholesale and retail trade industries because of increased use of technology, consolidation, and direct ordering from manufacturers.
Woodworking machine operators and tenders, setters and set-up operators	Large to very large decreases are projected for the industries manufacturing household and office furniture fixtures, and wood containers and miscellaneous wood products, because of labor-saving automation, such as computer-controlled woodworking machinery.
Word processors and typists	Large decreases are expected because of the growing use of user-friendly word processing software.
Writers and editors, including technical writers	There will be a moderate increase in newspapers and a large increase in periodicals because technological improvements in publishing are reducing the demand for other occupations relative to writers and editors.

Chapter IV. Estimating Occupational Replacement Needs

Information about projected job openings by occupation—openings that result from employment growth or the need to replace workers who leave an occupation— has many important applications. For example, students and vocational counselors use this information to make career choice decisions; planners of training programs use it to develop education policies; and personnel specialists use it in planning their recruiting efforts. The BLS has provided information on employment growth biennially through its employment projections program over the past five decades and, in 1992, resumed estimating job openings resulting from replacement needs.

After completing a comprehensive research effort, BLS researchers concluded that two definitions and two estimates of separations were needed to provide appropriate replacement needs information for different users. The first type of estimate, *total separations*, measures all individuals who leave their occupation. The second, *net separations*, measures the net movements of new and experienced workers into and out of occupations. As discussed below, both measures of separations are developed from the Current Population Survey, but each measure uses a different data element from the survey.

Concepts and definitions

During the past several decades, a variety of concepts have been used to calculate estimates of occupational replacement needs and job openings. These different concepts result in significantly different estimates of separations for the same occupation that often have confused users of the information. This section briefly summarizes the concepts currently used by BLS to calculate replacement needs data.. Figure 1 illustrates the differences between total and net separations.

Total separations. Total separations identify the flow of individuals leaving an occupation, for any reason whatsoever, without regard to persons entering the occupation. Total separations are the larger measure of separations. During a given period, individuals may leave an occupation for a variety of reasons, and must be replaced. Some become employed in a different occupation as a result of a promotion, a desire to change careers, the loss of an existing job, the need for a different job while attending school or training or caring for family, or some other reason. Others who leave an occupation stop working altogether because they retire, desire more time for leisure or for an extended vacation, assume family responsibilities, return to school, move out of the geographic area, become ill, or for some other reason. If employment in an occupation is to increase or remain the same, those individuals who left the occupation must be replaced. In most cases, total occupational separations are thus replacement needs and a source of job openings. If employment is declining, however, occupational separations exceed replacement needs by the amount of decline in employment because some persons who leave the occupation are not replaced. (Individuals who change employers but remain employed in the same occupation are not included in counts of replacement needs because job changes by these individuals have no impact on the number of openings for persons desiring to enter an occupation.)

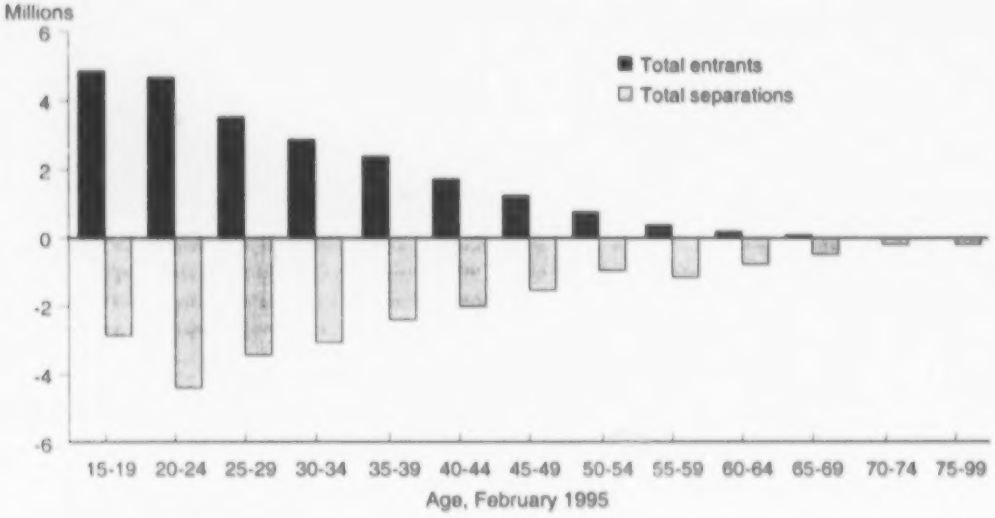
Net separations. Net separations summarize movements of workers into and out of an occupation over a specific period. If employment is not declining, net separations approximate the number of persons who permanently leave an occupation: they quantify the need for new entrants, and if training is required, identify minimum training requirements.

Employment data, by age, for two points in time are used to estimate net separations. For example, occupational employment, by age, is prepared for a base year and for a second year 5 years later. Employment figures for each age group in the base year are then compared with employment figures for the group that is 5 years older. For example, in a given occupation, employment in the base year for the 55- to 59-year-old group is compared with employment in the second year for the 60- to 64-year-old group. If employment has increased from the base-year group to the older, second-year group, then the increase measures net entrants into the occupation for the second group, and net separations from the occupation for that group are zero. If, instead, employment has declined across the two groups, the decline is recorded as net separations from that occupation. The total net separations from the occupation in question are then the sum of the net separations from that occupation for all age groups.

It is important to note that, within any age group, individuals may have done any of the following to stop being included in employment data for the occupation: Left the occupation and started working in another occupation, stopped working altogether, or left the region. Similarly, individuals entering the occupation may have been working

Total separations:

- Occur in all age groups
- Are independent of the total number of entrants
- Identify all of the normal movements out of occupations



Net separations:

- Occur only when total separations exceed total entrants within an age group
- For an occupation, are the sum of separations for each age group
- Exclude information about net entrants

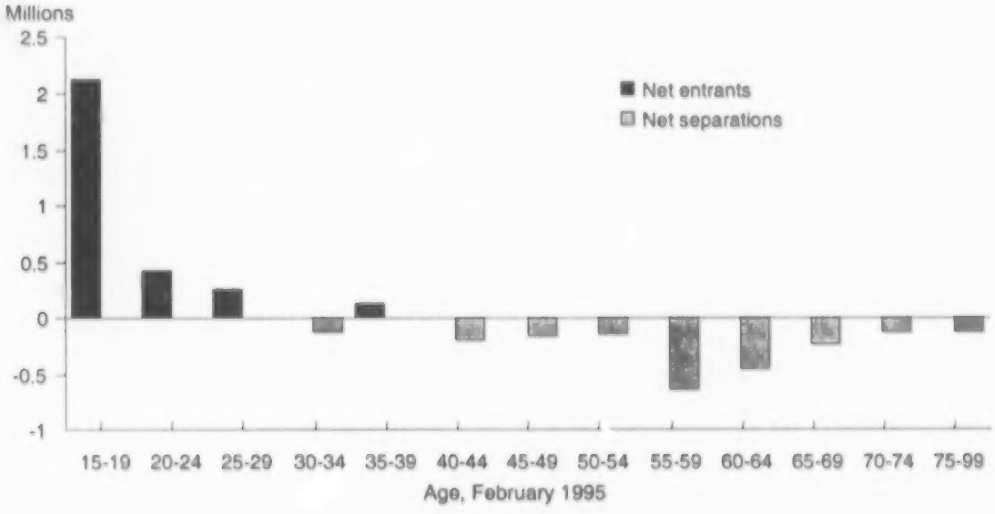


Figure 1. Total and net occupational entrants and separations, February 1995 to February 1996

in another occupation, may not have been working at all, or may have come from another region. The change measured over the period in question thus reveals only whether there were more or fewer entrants than separations, and tells nothing about the magnitude of total entrants, total separations, or any of their components. That is, the change indicates whether the size of the original age group increased or decreased, but it indicates nothing about the specific actions of individuals making up the group.

Replacement needs. In developing estimates of replacement needs, the distinction between total and net separations and replacement needs pertaining to an occupation must not be overlooked. When employment in an occupation remains the same or increases over a given period, replacement needs equal separations. Conversely, when employment declines, replacement needs are less than separations because some individuals leaving an occupation are not replaced.

During a period when employment in an occupation declines, total separations will be greater than they would be if employment increased because more individuals lose their jobs. Net separations would be greater not only because more individuals leave, but also because fewer enter the occupation. A decline in employment represents individuals who left an occupation and were not replaced; therefore, replacement needs during a time of declining employment are determined by reducing observed separations by the decline in employment.

Although it is conceptually possible that employment could decline to zero, the possibility is remote, especially with national data. In such an unlikely scenario, separations would equal the previous number of employees because all lost their jobs, and replacement needs would be zero (replacement needs = separations - employment decline = 0). During periods of employment decline, displaced workers are available to reenter the occupation later, and thus may reduce the need for training additional workers.

Developing measures of total separations

All individuals who leave an occupation—those who transfer to another occupation or who stop working for any reason—must be included in a measure of total separations. Producing such a measure requires longitudinal data that include information about individuals at two points in time. During the late 1970's, BLS researchers developed a procedure, using CPS data, for estimating the total number of job openings arising from workers who leave their occupation between two points that are 1 year apart. Annual data are preferable to data with other periodicities because most data on training program completions are compiled on an annual basis. Annual total separation data thus facilitate analyses of occupational supply and demand.

The method of measuring total separations consisted of using computer records to identify the same individuals in the CPS to create a matched sample over a 1-year period. In prior years, matched data were created for each of the 12 months and then were combined, resulting in a sample of about 500,000 persons aged 15 and older in the initial year. For this report, however, only 4 months of data (September through December) were available from 1995 and 1996 because identifying codes were suppressed due to a survey design change needed to protect the confidentiality of survey respondents. Suppressing the codes precluded identifying individuals in both samples.

With the matched sample, changes in an individual's employment status and occupation were tabulated. Next, the 4 months of matched data for 1995-96 dealing with changes in labor force status were merged with data on occupational transfers from a special study conducted as part of the February 1996 CPS. Occupational transfer data from the February 1996 CPS were used because matched CPS data overstate the number of workers who change occupations.

The excessively large estimate of occupational transfers in matched CPS data occurs because individuals may respond differently to the same CPS question about their occupation, responses may be recorded differently by interviewers collecting the data, or recorded information may be interpreted and coded differently by persons preparing files for computer processing. All these actions result in a different occupation being recorded in the second year when, in fact, no change of occupation occurred.

Combining 1995-96 matched CPS data and occupational transfer data from the February 1996 CPS yields *merged data* that provide a composite description of movements into, out of, and between occupations over two points 1 year apart. The resulting merged data identify the numbers and types of separations and the characteristics of workers who change occupations, become unemployed, or leave the labor force.

Total separations data for occupations with fewer than 50,000 employees in 1996 were judged unreliable because of the limited number of observations in the sample. Data for the remaining occupations were examined individually, and if data identifying specific reasons for leaving the occupation appeared suspect, another detailed occupational group was selected to serve as a proxy and provide substitute data.

The CPS is conducted primarily to obtain current data on the labor force status of individuals, rather than data that measure changes over time. There are significant limitations to the data that describe change as a result. The CPS is a household survey that obtains data about persons living at specific addresses. One limitation to the matched sample is that information can be developed only from the responses of individuals who do not change their residence. Movers tend to change their labor force status more than do nonmovers; hence, the separation rates are biased downward because movers are not included. Separation rates also are biased downward because the CPS excludes individuals who die between surveys.

By contrast, response and coding errors bias the separation rates upward. For example, if employed persons were

incorrectly classified as not being in the labor force during the second survey, the matched data would indicate movement where none occurred. Although the net effect of the various biases on the movements is not known, their impact is offsetting and not concentrated by occupation.

It must be emphasized that total separation rates developed from merged CPS data are not measured rates based on longitudinal data about individuals, but, rather, are a composite estimate of movements from occupations based on CPS data from two distinct sources. However, the rates are occupation specific and are extremely valuable for describing the labor market.

Table 6. Net separations for registered nurses and for waiters and waitresses, by age group, 1993-98

(Numbers in thousands)

1993 employment		1998 employment		Net change	Net separations, 1993-98	Separation rate, 1993-98
Age	Number	Age	Number			
Registered nurses						
16-99	1,733	—	2,006	273	116	6.7
		16-20	1	1	0	
16-19	1	21-24	65	64	0	0
20-24	75	25-29	203	128	0	0
25-29	211	30-34	282	71	0	0
30-34	307	35-39	355	48	0	0
35-39	332	40-44	398	66	0	0
40-44	287	45-49	298	11	0	0
45-49	202	50-54	190	-13	13	6.2
50-54	137	55-59	122	-15	15	10.8
55-59	101	60-64	61	-40	40	39.4
60-64	57	65-69	21	-36	36	63.3
65-69	16	70-74	7	-9	9	56.6
70-74	4	75-79	1	-3	3	68.1
75-99	1	80-99	1	0	0	20.0
Waiters and waitresses						
16-99	1,382	—	1,403	21	426	30.7
		16-20	273	273		
16-19	223	21-24	396	173	0	0
20-24	382	25-29	218	-164	165	43.1
25-29	228	30-34	158	-70	69	30.5
30-34	181	35-39	131	-50	50	27.7
35-39	128	40-44	81	-47	47	36.8
40-44	80	45-49	50	-30	30	37.1
45-49	56	50-54	37	-19	19	33.8
50-54	38	55-59	25	-13	13	33.2
55-59	29	60-64	21	-8	8	28.1
60-64	24	65-69	8	-16	16	66.6
65-69	9	70-74	3	-6	6	63.8
70-74	3	75-79	1	-2	2	61.4
75-99	1	80-99	1	0	1	40.9

Note: 1993 data are averages of 1989, 1990, 1991, 1992, and 1993; 1998 are averages of 1994, 1995, 1996, 1997 and 1998.

Developing measures of net separations

Because the classification system used in the CPS has changed little since 1983, changes in age groups over a 5-year period provide a comprehensive measure of occupation-specific net separations. When the size of a group increases, a measure of net entrants is recorded; when it declines, net separations are identified. Net changes in an age group capture the net effect of transfers into and out of occupations, immigration, and emigration, as well as of labor force entries and separations, including deaths. A 5-year period was chosen so as to reduce the impact of cyclical variations that might accompany a shorter period. Data for other periods can be developed, however. Data also can be developed by industry, educational level, sex, and a variety of other demographic variables. This "cohort" technique thus becomes a powerful tool for analyzing labor market changes.

Employment data for appropriate age groups, by occupation, were developed for 1989-94, 1990-95, 1991-96, 1992-97, and 1993-98. Initially, several hundred thousand records containing information on occupation, age, and many other characteristics for all employed persons in 1989 were combined, and occupational employment by age group was tabulated. The process was repeated to obtain data for desired age groups in 1994. To increase the sample size and reduce cyclical fluctuations, data for the same age groups recorded for 1989 were developed for 1990, 1991, 1992, and 1993, and data for the age groups used in 1994 were developed for 1995, 1996, 1997, and 1998. Data on employment by occupation, by age group, were then averaged and used to prepare the data presented in this chapter. To simplify the presentation, all references to 1993 data represent averages for 1989, 1990, 1991, 1992, and 1993, and references to 1998 data represent averages for 1994, 1995, 1996, 1997, and 1998.

Net leavers in most occupations occur only in the older age groups, usually above age 45. This pattern typically describes individuals leaving in large numbers to retire. A different pattern displayed in some occupations is the vast majority of all net separations taking place in the youngest age groups. In this case, large numbers of workers probably obtained employment in the occupation when they first entered the workforce. When they were ready to begin full-time jobs, or when they qualified for higher paying jobs,

Table 7. Net separations in selected occupations, by age group, 1993-98

(Numbers in thousands)

Current Population Survey occupation	Number employed, 1993[1]	Age group												
		16 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Teachers, except college and university	4,109	0	0	0	0	0	0	48	92	105	75	26	9	5
Teachers, prekindergarten	463	0	0	0	0	0	6	12	10	8	7	2	0	0
Teachers, elementary school	1,561	0	0	0	0	0	0	12	41	44	31	9	2	1
Teachers, secondary school	1,214	0	0	0	0	0	7	29	46	42	24	7	2	1
Teachers, special education	273	0	0	0	0	0	0	0	0	1	4	2	0	0
Teachers, n.e.c.[2]	599	0	0	0	0	0	0	0	0	9	10	6	5	3

[1] 1993 data are averages of 1989, 1990, 1991, 1992, and 1993

[2] n.e.c. = not elsewhere classified.

they transferred to another occupation. In both patterns, the net separations quantify the number of persons who permanently left the occupation. Table 6 shows these different patterns, and also illustrates how net separations for registered nurses and for waiters and waitresses were calculated.

In table 6, employment data by age group for registered nurses and for waiters and waitresses in 1993 are compared with corresponding data for a 5-year-older group in 1998. For example, the number of registered nurses aged 20-24 in 1993 is compared with the number of registered nurses aged 25-29 in 1998, and the difference is calculated. If the difference is positive, more individuals aged 20-24 in 1993 entered than left the occupation. Nothing is known about the numbers of persons transferring into the occupation, entering into the labor force, immigrating from another country, transferring out of the occupation, leaving the labor force, or leaving the United States. The difference between the two groups simply identifies the amount by which total entrants exceed total leavers. If, by contrast, the difference is negative, more individuals left than entered the occupation. Only a negative difference results in a measure of net separations. Positive differences are recorded as zero net separations for the age group. The separation rate for an age group is calculated by dividing net separations by 1993 employment in the age group. Net separations for all age groups were totaled and divided by total employment in 1993 to obtain the 5-year net separation rate for the occupation.

Table 6 also presents information on the percentage of leavers in each age group for registered nurses and for waiters and waitresses. This measure is calculated by dividing net leavers in the age group by 1993 employment for that age group. Information about the percentage of leavers in each age group is valuable because it permits estimates of net leavers in the future, which will be discussed later.

Registered nurses and waiters and waitresses are large occupations, so the CPS sample for these occupations provides quite reliable employment data for each age group within them. For small occupations, however, such as actuaries, statisticians, and mathematical scientists not elsewhere classified, the sample is too small and the net separation data are unreliable. For example, statisticians have an irregular distribution of net separations among the age groups, and the net separation rate of about 25 percent is inconsistent with rates for other professional occupations.

To obtain a separation rate for each detailed CPS occupation, one of two procedures was used when an occupation was judged to be unreliable on the basis of its data. When a larger detailed occupation had characteristics similar to those of the occupation in question, the larger occupation was chosen as a proxy for it, and the separation and employment data for the proxy occupation were substituted for the unreliable data and were used to calculate separation rates. When there was no larger detailed occupation with characteristics similar to those of the occupation in question, separation and employment data for a summary occupation group were substituted for the unreliable data. This procedure for determining separation rates was not as straightforward as the former. Note in table 7 that, for the summary occupational group, teachers, except college and university, no net separations are measured in the data until age 45. Yet, of the detailed occupations making up the group, prekindergarten, and secondary school teachers, exhibit net separations prior to that age. The summary occupation does not register those separations because total net entrants in the other detailed occupations—elementary, special education, and not elsewhere covered teachers—exceeded the total of net separations among prekindergarten, and secondary school teachers. To exclude the measure of net separations from the summary occupation, however, would result in an understatement of separations from detailed occupations. To overcome this limitation, net separations in each age group for summary occupations were calculated by totaling the net separations for each detailed occupation in that age group. Thus, the net separations data for each age group for the summary occupation group, teachers, except college and university, in table 8 is the sum of the data measured for prekindergarten, elementary, secondary, special education, and not elsewhere classified teachers. (Because unrounded data are used, the totals shown may not be the sum of the data for detailed occupations.)

Projected replacement rates

Thus far, all information presented about separations has been descriptive and retrospective; that is, it has described

Table 8. Net separations in selected occupations, adjusted summary occupation, by age group, 1993-98

(Numbers in thousands)

Current Population Survey occupation	Number employed, 1993[1]	Age group											
		16 - 19	20 - 24	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59	60 - 64	65 - 69	70 - 74	75 - 79
Teachers, except college and university	4,109	0	0	0	0	0	13	53	98	105	75	26	9	5
Teachers, prekindergarten	463	0	0	0	0	0	6	12	10	8	7	2	0	0
Teachers, elementary school	1,561	0	0	0	0	0	0	12	41	44	31	9	2	1
Teachers, secondary school	1,214	0	0	0	0	0	7	29	46	42	24	7	2	1
Teachers, special education	273	0	0	0	0	0	0	0	0	1	4	2	0	0
Teachers, n.e.c.[2]	599	0	0	0	0	0	0	0	0	9	10	6	5	3

[1] 1993 data are averages of 1989, 1990, 1991, 1992, and 1993

[2] n.e.c. = not elsewhere classified.

what has occurred in the past. The Bureau's Employment Projections program, however, focuses on future opportunities, a purpose that requires projections of employment change and, in addition, projections of replacement needs due to total and net separations.

Total replacement rates. Total separation rates for all detailed occupations were developed from merged CPS data for the period 1995-96. As described earlier, total separation rates from proxy occupations were substituted for small occupations because the data appeared unreliable. If employment in the occupation in question remained the same or increased from 1995 to 1996, the 1995-96 total separation rate also was the replacement rate and should be used to estimate replacement needs during a projection period. However, if employment declined, the replacement rate was calculated by subtracting the employment decline from the separations. Total replacement rates were used without adjustment for the 1998-2008 projection period. Employment for 2003, the midpoint of the projection period, was multiplied by the annual average rates for the 1995-96 period to project annual average replacement needs, 1998-2008. Although labor market conditions affect the replacement rates, attempts to adjust the rates would be fraught with difficulties because not enough is known about how cyclical factors and other labor market conditions affect the rates.

Net replacement rates. To develop a net separation rate for an occupation, employment figures for that occupation in a given age group in 1993 were compared with employment in the occupation in 1998 for a group that was 5 years older. As noted earlier, data for 1993 actually consist of the average of data for 1989, 1990, 1991, 1992, and 1993, and data for 1998 consist of the average for 1994, 1995, 1996, 1997, and 1998. If employment for the group increased, no net separations occurred, and separations were recorded as zero. If employment declined, the number was recorded as net separations for that age group. The 5-year net separation rate for the age group was calculated by dividing the number of net separations by employment in 1993. (See table 6.) The 5-year net separation rates for 1993-98 for each age group could then be applied to employment in future years to obtain a projection of net separations.

Between 1993 and 1998, employment in most occupations increased or remained the same. It should also be noted that the 1993-98 net separation rates, by age, were used without adjustment to estimate replacement needs during the projection period. If employment declined, however, one of several adjustments to the age-specific separation rates was used to obtain a replacement rate that reduced the occupational separation rate by the rate of decline in employment. When the employment decline was less than the number of net separations among persons aged 16 to 49 in 1993, the number of net separations among persons aged 16 to 49 was reduced by the employment decline. The decline was distributed in proportion to the number of net separations in each age subgroup in the group aged 16 to 49. This technique was most frequently used; it confines the adjustments to the ages most affected by adverse economic conditions. Older workers are more likely to remain employed until they retire. In most of the remaining cases, the net separations were reduced in a like fashion for persons aged 16 to 54 or persons aged 16 to 65, depending on the distribution of net separations in the occupation and the amount by which employment declined. Then, the adjusted age-specific rates were used to calculate future net replacement needs for persons employed in 1998. Excluded from these projections are replacement needs for persons who enter an occupation within the projection period.

Showing data for the persons employed as registered nurses in 1998, table 9 illustrates the method for calculating net leavers over the period 1998-2008. First, net leavers were calculated for 1998-2003 by multiplying 1998 employment obtained from the CPS for each age group by the replacement rate in 1993-98 for the same age group. Before net leavers in 2003-2008 were calculated, employment in 2003 for each age group was estimated by identifying employment in 1998 for a 5-year-younger age group and subtracting any projected net leavers for the period 1998-2003. For example, table 9 shows the 2003 employment figure for registered nurses aged 55 to 59 to be 169,000. This estimate was arrived at by identifying the 1998 employment figure for nurses aged 50 to 54 (190,000) and subtracting the 20,000 net leavers in 1998-2003 from that age group (discrepancies due to rounding). When employ-

ment for each age group for 2003 was developed, the resulting figure was multiplied by the replacement rate for that age group to estimate net leavers for 2003-2008. Summing the number of net leavers for each of the 5-year groups provided an estimate of net leavers for the 10-year period 1998-2008. Net leavers over the 10-year projection period 1998-2008 were determined by combining estimates for the 5-year periods 1998-2003 and 2003-2008. Dividing the net separations for 1998-2008 by 10 yielded annual average net separations; the annual average net separations were divided by 1998 employment to yield an annual average net separation rate.

New entrants—that is, individuals who were younger than age 16 in 1998 but who can be expected to join the group of employed persons after 1998—are not included in the estimate of separations for 1998-2008. If they were included, estimates of separations with net transfers in the younger age groups—such as those for waiters and waitresses—would be larger.

Table 9. Net replacement data for registered nurses, by age group, 1998-2008

(Numbers in thousands)

Age	1998 employment[1]		Net replacement needs 1998-2003	2003 employment	Net replacement needs, 2003-2008
	Number	Replacement rate 1993-98 (Percent)		Number	
16-99	2,006	6.7	134	—	188
16-19	1	0	0	0	0
20-24	65	0	0	1	0
25-29	203	0	0	65	0
30-34	282	0	0	203	0
35-39	355	0	0	282	0
40-44	398	0	0	355	0
45-49	298	6.2	18	398	25
50-54	190	10.8	20	279	30
55-59	122	39.4	48	169	67
60-64	61	63.3	39	74	47
65-69	21	56.6	12	23	13
70-74	7	68.1	5	9	6
75-99	2	20.0	0	4	1

[1] 1998 data are averages for 1994, 1995, 1996, 1997, and 1998

Replacement rates based on the Occupational Employment Statistics survey

The preceding section described procedures for estimating annual average replacement rates of total and net separations for detailed CPS occupations. The BLS projections program uses an employment matrix to estimate current and projected employment data that primarily are based on the occupational classification system of the Occupation Employment Statistics (OES) survey. Current and projected occupational employment data based are used for calculating the employment change component of projected job openings. To obtain the replacement needs components of projected total and net job openings, estimates of total and net separations based on the OES survey occupations had to be developed. The procedure required total and net separation rates for all detailed occupations based on the OES survey. These rates were developed by identifying the CPS occupation or occupations that are equivalent to the detailed OES-survey-based occupation, and by either using the CPS rate directly or calculating a weighted rate using OES or CPS employment figures as weights if the occupation consisted of more than one OES or CPS occupation. This process was not required for matrix occupations based on CPS occupational classification data. Table 10 presents 1998-2008 total and net replacement rates for 1998 matrix occupations and identifies 1998-2008 annual average total and net replacement needs. Information identifying OES occupations for which CPS equivalent occupational data were replaced with that of a proxy CPS occupation, and the CPS occupation that provided the proxy data, is available from the Division of Occupational Outlook at (202) 691-5703.

Frequently asked questions about replacement data

Q. *Why does BLS compute estimates of both total and net replacement needs data?*

A. A single estimate is not appropriate for all purposes. Vocational guidance counseling, for example, requires information about growth and replacement needs that quantifies all opportunities in the labor market. However, training program planning is better served with information about opportunities for new entrants. Thus, two different estimates are provided.

Q. *Why is the estimate of growth and net replacement needs described as providing a minimum measure of training needs?*

A. In the younger age groups, more individuals are entering than leaving the occupation, and the measure of net separations for that age group is zero. A trained person who died may require a replacement, but would not be included in net replacement needs estimates. More significantly, not all persons completing training enter the occupation for which they qualify. As a result, more workers must be trained to ensure that the minimum number enter the occupation.

Q. *Do the 1998-2008 projected net replacement rates assume that future labor market behavior will not change from past patterns?*

A. Yes, 1993-98 occupation- and age-specific rates are used in calculating the projected rates. The 1993-98 rates are applied to projected occupational age-distribution data. The result is an occupation-specific replacement rate that captures the impact of demographic, but not behavioral, changes.

Q. *Are total and net separation rates the same as total and net replacement needs?*

A. In most occupations, yes. If employment declines during the period being examined, however, separations will exceed replacement needs by the employment decline. When employment is declining, not all persons separating from the occupation are replaced.

Q. *Should a projected decline in employment be subtracted from replacement needs to estimate job opportunities?*

A. No! If employment declines, the number of opportunities resulting from growth is zero, with replacement needs comprising the only source. When employment declines, separations increase both because individuals are losing their jobs, and with net separations, because fewer are entering the occupation. Replacement needs—calculated by reducing separations by any decline in employment—should not be further reduced by projected employment declines.

Q. *If employment is declining rapidly, is it possible for replacement needs to be zero?*

A. In the extreme case, yes. For example, assume that, in a limited geographic area, a single firm is the sole employer of tool and die makers. If the firm ceases operations, all tool and die makers in the area will leave the occupation; separations will equal the decline in employment and there are no replacement needs. An analogous situation, though possible, is unlikely to occur at the national level because not all areas of the country share the same market conditions.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Total, all occupations	140,514	17.4	2.4	23.6	26,199	3,311
Executive, administrative, and managerial occupations	14,770	11.6	1.8	18.1	1,847	268
Managerial and administrative occupations	10,139	11.2	1.8	17.7	1,233	180
Administrative services managers	364	10.1	1.8	17.5	40	6
Advertising, marketing, promotions, public relations, and sales managers	485	14.4	1.4	13.9	78	7
Communication, transportation, and utilities operations managers	196	10.1	1.8	17.5	22	3
Construction managers	270	10.1	1.8	17.5	29	5
Education administrators	447	11.4	2.5	25.1	54	11
Engineering, natural science, and computer and information systems managers	326	10.1	1.8	17.5	40	6
Financial managers	693	9.2	1.6	15.8	68	11
Food service and lodging managers	595	20.1	1.8	17.5	129	10
Funeral directors and morticians	28	11.9	1.8	17.8	4	([1])
General managers and top executives	3,362	10.1	1.8	17.5	366	59
Government chief executives and legislators[2]	80	6.7	2.5	25.1	5	2
Human resources managers	230	11.3	2.3	23.4	28	5
Industrial production managers	208	10.1	1.8	17.5	21	4
Medical and health services managers	222	9.2	1.8	17.8	24	4
Postmasters and mail superintendents	26	11.9	1.8	17.8	3	([1])
Property, real estate, and community association managers	315	12.8	1.3	13.4	43	4
Purchasing managers	176	12.8	2.2	22.5	23	4
All other managers and administrators[2]	2,114	11.2	1.8	17.6	254	37
Management support occupations	4,631	12.3	1.9	19.0	614	88
Accountants and auditors	1,080	10.3	1.5	15.5	117	17
Assessors and real estate appraisers	70	10.4	2.1	20.8	8	1
Assessors	22	6.5	2.3	23.1	2	1
Real estate appraisers	48	11.6	2.0	20.2	6	1
Budget analysts	59	13.9	2.2	21.9	9	1
Buyers and purchasing agents	371	19.9	2.5	25.3	76	9
Purchasing agents and buyers, farm	29	16.9	2.6	25.8	5	1
Purchasing agents, except wholesale, retail, and farm products	224	16.9	2.6	25.8	40	6
Wholesale and retail buyers, except farm products	118	26.3	2.4	24.2	31	3
Construction and building inspectors	68	3.3	2.6	25.7	2	2
Cost estimators	152	15.9	1.2	12.2	26	2
Credit analysts	42	13.9	2.2	21.9	6	1
Employment interviewers, private or public employment service	66	19.0	2.7	26.6	13	2
Human resources, training, and labor relations specialists	367	19.0	2.7	26.6	76	10
Inspectors and compliance officers, except construction	176	9.7	1.8	18.2	18	3
Insurance claims adjusters, appraisers, examiners, and investigators	239	6.2	1.7	16.7	16	4
Insurance claims adjusters, examiners, and investigators	229	6.2	1.7	16.7	16	4
Claims examiners, property and casualty insurance	49	6.2	1.7	16.7	3	1
Insurance adjusters, examiners, and investigators	180	6.2	1.7	16.7	12	3
Insurance appraisers, auto damage	10	6.2	1.7	16.7	1	([1])
Insurance underwriters	97	3.6	2.8	28.1	4	3
Loan counselors and officers	227	13.9	2.2	21.9	35	5
Management analysts[2]	344	3.6	0.8	7.9	14	3
Tax examiners, collectors, and revenue agents	62	7.4	2.2	21.8	5	1
Tax preparers	79	13.9	2.2	21.9	12	2
All other management support workers[2]	1,130	14.1	2.0	19.7	175	22
Professional specialty occupations	19,802	10.1	1.9	19.2	2,264	380
Engineers	1,462	6.5	2.2	21.8	104	32
Aerospace engineers[2]	53	2.1	1.6	16.2	1	1
Chemical engineers	48	6.8	2.2	22.5	3	1
Civil engineers	195	7.7	1.9	19.2	17	4
Electrical and electronics engineers	357	5.1	2.1	21.3	20	8
Industrial engineers, except safety engineers	126	8.6	1.4	14.2	12	2
Materials engineers	20	6.8	2.3	23.0	1	([1])
Mechanical engineers	220	2.4	1.9	19.3	6	4
Mining engineers, including mine safety engineers[2]	4	6.8	2.3	23.0	([1])	([1])
Nuclear engineers[2]	12	6.8	2.3	23.0	1	([1])

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Petroleum engineers[2]	12	6.8	2.3	23.0	1	(1)
All other engineers[2]	415	9.1	2.8	27.6	42	11
Architects and surveyors	163	8.6	1.7	16.9	15	3
Architects, except landscape and naval	99	5.4	1.5	14.9	6	1
Landscape architects	22	5.4	1.5	14.9	1	(1)
Surveyors, cartographers, and photogrammetrists[2]	41	17.8	2.3	22.7	7	1
Life scientists	173	7.2	2.4	24.1	14	4
Agricultural and food scientists[2]	21	6.2	2.6	25.7	1	1
Biological scientists	81	8.0	2.1	20.9	8	2
Conservation scientists and foresters[2]	39	6.2	2.6	25.7	3	1
Medical scientists	31	7.0	2.9	29.4	2	1
All other life scientists	1	8.0	2.1	20.9	(1)	(1)
Computer, mathematical, and operations research occupations	1,653	10.4	0.8	8.1	251	13
Actuaries[2]	16	9.6	1.4	14.2	2	(1)
Computer systems analysts, engineers, and scientists	1,530	10.6	0.7	6.8	243	10
Computer engineers and scientists	914	10.6	0.7	7.2	147	7
Computer engineers	299	10.6	0.6	6.2	49	2
Computer support specialists	429	10.6	0.6	6.2	69	3
Database administrators	87	10.1	1.6	16.3	12	1
All other computer scientists	97	10.6	0.6	6.2	16	1
Systems analysts	617	10.6	0.6	6.2	96	4
Statisticians[2]	17	9.6	1.4	14.2	2	(1)
Mathematicians and all other mathematical scientists[2]	14	9.6	1.4	14.2	1	(1)
Operations research analysts	76	5.9	3.1	31.3	5	2
Physical scientists	200	6.4	2.4	24.1	14	5
Atmospheric scientists	8	6.2	2.6	25.7	1	(1)
Chemists	96	6.6	2.2	22.3	7	2
Geologists, geophysicists, and oceanographers[2]	44	6.2	2.6	25.7	3	1
Physicists and astronomers[2]	18	6.2	2.6	25.7	1	(1)
All other physical scientists[2]	33	6.2	2.6	25.7	2	1
Religious workers	304	8.0	1.8	17.7	26	5
Clergy	149	7.7	2.0	19.6	12	3
Directors, religious activities and education[2]	112	8.4	1.6	15.9	10	2
All other religious workers[2]	43	8.4	1.6	15.9	4	1
Social scientists	321	11.8	1.9	19.5	41	6
Economists	70	13.4	2.1	20.8	10	1
Psychologists	166	11.2	1.8	18.5	20	3
Urban and regional planners[2]	35	11.8	2.0	20.4	4	1
All other social scientists[2]	50	11.8	2.0	20.4	6	1
Social and recreation workers	1,303	13.9	2.0	19.6	215	26
Recreation workers	241	14.9	2.6	26.4	39	6
Residential counselors	190	8.2	2.3	22.9	19	4
Social and human service assistants	268	22.9	2.6	26.1	78	7
Social workers	604	11.3	1.3	13.0	81	8
Lawyers and judicial workers	752	3.6	1.1	11.4	29	9
Judges, magistrates, and other judicial workers[2]	71	3.6	1.5	15.4	3	1
Lawyers	681	3.6	1.1	11.0	26	7
Teachers, librarians, and counselors	6,939	12.0	2.2	22.0	912	152
Teachers, preschool and kindergarten	529	8.4	2.1	21.3	49	11
Teachers, preschool	346	8.4	2.1	21.3	33	7
Teachers, kindergarten	184	8.4	2.1	21.3	16	4
Teachers, elementary school	1,754	9.9	2.3	23.1	184	41
Teachers, secondary school	1,426	6.4	3.2	31.9	101	46
Teachers, special education	406	4.8	0.8	8.4	23	3
College and university faculty[2]	865	12.4	2.8	27.7	120	24
Other teachers and instructors	956	23.0	1.1	10.5	241	10
Farm and home management advisors	10	23.0	1.1	10.5	2	(1)
Instructors and coaches, sports and physical training	359	23.0	1.1	10.5	94	4
Adult and vocational education teachers	588	23.0	1.1	10.5	145	6

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Instructors, adult (nonvocational) education	168	23.0	1.1	10.5	43	2
Teachers and instructors, vocational education and training	420	23.0	1.1	10.5	102	4
All other teachers and instructors[2]	644	21.1	1.4	13.7	146	9
Librarians, archivists, curators, and related workers	175	15.5	2.6	25.7	28	5
Archivists, curators, museum technicians, and conservators[2]	23	15.5	2.7	27.0	4	1
Librarians	152	15.5	2.6	25.5	24	4
Counselors	182	8.2	2.3	22.9	17	4
Health diagnosing occupations	892	2.8	1.7	17.3	27	15
Chiropractors[2]	46	2.8	2.1	20.6	1	1
Dentists	160	1.1	2.0	20.3	2	3
Optometrists[2]	38	2.8	2.1	20.6	1	1
Physicians	577	3.2	1.6	15.6	20	9
Podiatrists[2]	14	2.8	2.1	20.6	(1)	(1)
Veterinarians[2]	57	2.8	2.1	20.6	2	1
Health assessment and treating occupations	2,860	6.0	1.7	17.0	191	49
Dietitians and nutritionists	54	12.0	2.0	20.3	7	1
Pharmacists	185	2.6	2.7	27.4	5	5
Physician assistants[2]	66	3.6	1.7	16.7	3	1
Registered nurses	2,079	6.5	1.7	16.5	150	34
Therapists	476	4.6	1.5	15.0	26	7
Occupational therapists[2]	73	4.6	1.5	15.0	4	1
Physical therapists[2]	120	4.6	1.5	15.0	7	2
Radiation therapists[2]	12	4.6	1.5	15.0	1	(1)
Recreational therapists[2]	39	4.6	1.5	15.0	2	1
Respiratory therapists[2]	86	4.6	1.5	15.0	5	1
Speech-language pathologists and audiologists[2]	105	4.6	1.5	15.0	6	2
All other therapists[2]	40	4.6	1.5	15.0	2	1
Writers, artists, and entertainers	1,996	14.1	2.1	21.0	310	42
Actors, directors, and producers	160	15.3	2.2	22.4	27	4
Announcers	60	21.5	2.4	23.9	13	1
Artists and commercial artists	308	14.6	2.1	20.7	51	6
Athletes, coaches, umpires, and related workers	52	30.5	3.5	35.4	18	2
Dancers and choreographers[2]	29	15.4	2.2	22.4	5	1
Designers	423	12.8	1.5	14.6	61	6
Designers, except interior designers	335	12.8	1.5	14.6	49	5
Interior designers	53	12.8	1.5	14.6	8	1
Merchandise displayers and window dressers	34	12.8	1.5	14.6	5	(1)
Musicians, singers, and related workers	273	13.9	1.9	19.1	41	5
News analysts, reporters, and correspondents	67	11.3	3.1	30.7	8	2
Photographers and camera operators	161	12.0	1.5	14.7	20	2
Camera operators, television, motion picture, video[2]	11	12.0	1.5	14.7	2	(1)
Photographers	149	12.0	1.5	14.7	19	2
Public relations specialists	122	16.3	2.6	26.2	22	3
Writers and editors, including technical writers	341	11.7	2.6	26.4	45	9
All other professional workers[2]	785	13.7	2.4	24.1	119	19
Technicians and related support occupations	4,949	8.5	2.2	22.2	465	110
Health technicians and technologists	2,447	7.1	2.1	20.6	195	50
Cardiovascular technologists and technicians[2]	21	10.6	2.5	24.7	3	1
Clinical laboratory technologists and technicians	313	4.4	1.3	12.7	15	4
Dental hygienists	143	5.5	2.2	22.5	10	3
EKG technicians	12	10.6	2.5	24.7	1	(1)
Electroneurodiagnostic technologists[2]	5	10.6	2.5	24.7	1	(1)
Emergency medical technicians and paramedics[2]	150	10.6	2.5	24.7	18	4
Licensed practical and licensed vocational nurses	692	3.9	2.1	21.4	30	15
Medical records and health information technicians[2]	92	6.6	2.5	24.7	7	2
Nuclear medicine technologists	14	4.5	1.4	13.9	1	(1)
Opticians, dispensing	71	6.3	1.2	12.4	5	1
Pharmacy technicians[2]	109	10.6	2.5	24.7	12	3

See footnotes at end of table.

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Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Psychiatric technicians	66	20.7	1.4	13.9	14	1
Radiologic technologists and technicians	162	4.5	1.4	13.9	8	2
Surgical technologists[2]	54	10.6	2.5	24.7	7	1
Veterinary technologists and technicians[2]	32	6.7	2.3	22.8	2	1
All other health professionals and paraprofessionals[2]	510	10.3	2.4	24.3	62	12
Engineering and science technicians and technologists	1,351	10.9	2.3	23.0	157	31
Engineering technicians	771	12.1	2.3	22.7	101	17
Electrical and electronic technicians and technologists	335	10.2	2.0	20.4	37	7
All other engineering technicians and technologists[2]	437	13.6	2.4	24.4	64	11
Drafters	283	9.5	2.4	24.0	28	7
Science and mathematics technicians[2]	227	6.7	2.3	22.8	16	5
Surveying and mapping technicians	69	17.8	2.3	22.7	14	2
Technicians, except health and engineering and science	1,152	8.5	2.5	24.9	111	29
Aircraft pilots and flight engineers	94	4.2	2.2	21.8	4	2
Air traffic controllers[2]	30	7.5	2.7	27.4	2	1
Broadcast and sound technicians[2]	37	7.5	2.7	27.4	3	1
Computer programmers	648	7.5	3.1	31.0	56	20
Legal assistants and technicians, except clerical	252	12.4	0.9	8.8	37	2
Paralegals and legal assistants	136	14.3	0.8	8.4	26	1
Title examiners, abstractors, and searchers	30	14.3	0.8	8.4	4	([1])
All other legal assistants, including law clerks	86	8.8	1.0	9.7	8	1
Library technicians[2]	72	10.4	2.7	27.4	8	2
All other technicians[2]	20	9.3	2.7	27.4	2	1
Marketing and sales occupations	15,341	24.6	2.9	29.5	4,057	452
Cashiers	3,198	35.5	4.4	43.6	1,235	139
Counter and rental clerks	469	36.1	4.3	43.3	189	20
Insurance sales agents	387	9.8	2.3	22.8	38	9
Marketing and sales worker supervisors	2,584	14.2	1.3	13.1	384	34
Models, demonstrators, and product promoters	92	23.1	2.7	27.0	25	2
Parts salespersons	300	11.6	2.9	28.7	35	9
Real estate agents and brokers	347	11.6	2.0	20.2	42	7
Brokers, real estate	63	11.6	2.0	20.2	8	1
Sales agents, real estate	285	11.6	2.0	20.2	34	6
Retail salespersons	4,056	28.8	3.4	33.9	1,249	137
Sales engineers	79	2.1	1.9	19.4	2	2
Securities, commodities, and financial services sales agents	303	13.3	0.8	7.6	49	2
Travel agents[2]	138	9.6	2.1	21.0	14	3
All other sales and related workers[2]	3,388	22.1	2.6	25.9	809	88
Administrative support occupations, including clerical	24,461	18.5	2.0	20.0	4,730	490
Adjusters, investigators, and collectors	1,237	18.8	1.5	15.1	261	19
Adjustment clerks	479	22.4	0.7	6.5	125	3
Bill and account collectors	311	26.0	2.6	26.5	95	8
Insurance claims, examining and policy processing clerks	339	12.5	1.5	14.7	45	5
Insurance claims clerks	160	6.2	1.7	16.7	11	3
Insurance examining clerks	10	18.0	1.3	13.0	2	([1])
Insurance policy processing clerks	170	18.0	1.3	13.0	32	2
Welfare eligibility workers and interviewers	109	1.9	2.1	21.5	2	2
Communications equipment operators	297	23.4	2.2	21.9	64	6
Telephone operators	261	23.6	2.2	21.7	57	6
Central office operators	23	23.6	2.2	21.7	5	1
Directory assistance operators	23	23.6	2.2	21.7	5	1
Switchboard operators	214	23.6	2.2	21.7	47	5
All other communications equipment operators[2]	36	22.3	2.3	22.6	8	1
Computer operators	251	14.7	1.4	14.2	32	4
Peripheral equipment operators[2]	27	15.5	1.4	14.2	3	([1])
Computer operators, except peripheral equipment	224	14.6	1.4	14.2	29	3
Information clerks	1,910	24.3	2.3	22.6	511	43
Hotel, motel, and resort desk clerks	159	34.4	3.8	38.4	58	6
Interviewing clerks, except personnel and social welfare	128	29.0	3.2	32.2	42	4
New accounts clerks, banking	111	29.0	3.2	32.2	35	4

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Receptionists and information clerks	1,293	24.6	1.9	19.1	356	25
Reservation and transportation ticket agents and travel clerks[2]	219	9.6	2.1	21.0	22	5
Mail clerks and messengers	247	22.9	2.4	23.7	59	6
Couriers and messengers	120	27.2	2.4	23.7	34	3
Mail clerks, except mail machine operators and postal service	128	18.9	2.4	23.7	25	3
Postal clerks and mail carriers	405	2.2	2.6	26.0	9	11
Postal mail carriers	332	1.4	2.8	28.1	5	9
Postal service clerks	73	5.7	1.6	16.3	4	1
Material recording, scheduling, dispatching, and distributing occupations	4,183	20.0	1.6	16.4	855	69
Dispatchers	248	17.1	1.6	16.3	45	4
Dispatchers, except police, fire, and ambulance	163	17.1	1.6	16.3	30	3
Dispatchers, police, fire, and ambulance	85	17.1	1.6	16.3	15	1
Meter readers, utilities[2]	50	22.5	2.5	25.2	11	1
Procurement clerks	58	18.2	1.5	15.1	10	1
Production, planning, and expediting clerks	248	24.8	1.2	11.8	62	3
Shipping, receiving, and traffic clerks	1,000	23.6	1.7	16.6	240	17
Stock clerks and order fillers	2,331	17.9	1.6	16.0	429	37
Weighers, measurers, checkers, and samplers, recordkeeping[2]	51	22.5	2.5	25.2	11	1
All other material recording, scheduling, and distribution workers[2]	196	23.2	2.3	22.6	47	4
Records processing occupations	3,731	17.5	2.1	21.5	656	80
Advertising clerks[2]	14	15.1	2.4	23.9	2	(1)
Brokerage clerks	77	18.0	1.3	13.0	16	1
Correspondence clerks[2]	25	15.1	2.4	23.9	4	1
File clerks	272	40.3	3.5	34.8	115	9
Financial records processing occupations	2,698	15.3	1.9	18.9	410	51
Billing, cost, and rate clerks	342	15.9	2.0	19.9	58	7
Billing and posting clerks and machine operators[2]	107	10.2	2.0	19.8	11	2
Bookkeeping, accounting, and auditing clerks	2,078	16.0	1.9	18.7	325	39
Payroll and timekeeping clerks	172	9.3	2.0	19.9	15	3
Library assistants and bookmobile drivers	127	24.7	4.9	48.6	34	6
Order clerks	362	15.1	2.4	23.9	56	9
Human resources assistants, except payroll and timekeeping	142	15.1	1.9	18.9	22	3
Statement clerks	16	18.0	1.3	13.0	3	(1)
Secretaries, stenographers, and typists	3,764	13.6	1.7	16.7	511	63
Court reporters, medical transciptionists, and stenographers[2]	110	12.6	1.6	16.3	15	2
Secretaries	3,195	13.3	1.6	16.3	430	52
Legal secretaries	285	13.3	1.6	16.3	40	5
Medical secretaries	219	13.3	1.6	16.3	31	4
Secretaries, except legal and medical	2,690	13.3	1.6	16.3	358	44
Word processors and typists	459	15.8	1.9	19.5	65	9
Other clerical and administrative support workers	8,436	19.7	2.3	22.5	1,792	190
Bank tellers	560	19.6	4.3	42.9	107	24
Court, municipal, and license clerks	100	23.8	1.6	16.1	25	2
Court clerks	51	23.8	1.6	16.1	13	1
License clerks	24	23.8	1.6	16.1	6	(1)
Municipal clerks	25	23.8	1.6	16.1	6	(1)
Credit and loan authorizers, checkers, and clerks	254	23.2	1.0	9.9	61	3
Credit authorizers	17	23.1	1.2	11.5	4	(1)
Credit checkers	41	22.4	0.7	6.5	9	(1)
Loan and credit clerks	179	23.4	1.1	10.5	44	2
Loan interviewers	16	23.4	1.1	10.5	4	(1)
Data entry keyers	435	22.8	0.8	7.6	104	3
Duplicating, mail, and other office machine operators[2]	197	21.3	3.0	29.5	42	6
Office and administrative support supervisors and managers	1,611	11.7	2.3	22.5	207	36
Office clerks, general	3,021	21.5	2.8	27.7	699	84
Proofreaders and copy markers[2]	41	22.5	3.1	30.9	9	1
Statistical clerks	72	7.5	1.4	13.5	5	1
Teacher assistants	1,192	22.2	1.1	11.5	306	14
All other clerical and administrative support workers	953	21.9	1.8	17.8	227	17

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Service occupations	22,548	25.8	3.1	31.4	6,317	708
Cleaning and building service occupations, except private household	3,623	20.4	2.1	20.9	781	76
Institutional cleaning supervisors	87	8.8	2.3	23.4	8	2
Janitors and cleaners, including maids and housekeeping cleaners	3,184	20.8	2.1	20.8	699	66
Pest control workers[2]	52	11.4	2.3	22.7	7	1
All other cleaning and building service workers[2]	300	21.4	2.1	21.0	66	6
Food preparation and service occupations	8,735	35.4	4.7	46.5	3,282	406
Chefs, cooks, and other kitchen workers	3,306	32.8	3.7	37.1	1,157	123
Cooks, except short order	1,373	29.0	2.6	26.1	424	36
Bakers, bread and pastry	171	29.0	2.6	26.1	54	4
Cooks, institution or cafeteria	418	29.0	2.6	26.1	123	11
Cooks, restaurant	783	29.0	2.6	26.1	248	20
Cooks, short order and fast food	677	29.0	2.6	26.1	214	18
Food preparation workers[2]	1,256	39.1	5.5	55.1	516	69
Food and beverage service occupations	5,150	36.9	5.3	53.0	2,018	273
Bartenders	404	20.8	4.3	42.8	85	17
Dining room and cafeteria attendants and bar helpers	405	43.6	3.0	30.5	180	12
Food counter, fountain, and related workers[2]	2,025	42.8	6.1	60.7	920	123
Hosts and hostesses, restaurant, lounge, or coffee shop	297	32.5	3.1	30.5	105	9
Waiters and waitresses	2,019	33.5	5.5	55.1	728	111
All other food preparation and service workers	280	36.6	3.8	38.5	107	11
Health service occupations	2,309	18.1	1.7	16.8	480	39
Ambulance drivers and attendants, except EMTs	19	15.5	2.3	23.4	4	([1])
Dental assistants	229	16.9	1.5	15.3	47	3
Medical assistants[2]	252	10.6	2.5	24.7	34	6
Nursing and psychiatric aides	1,461	20.7	1.4	13.9	338	20
Nursing aides, orderlies, and attendants	1,367	20.7	1.4	13.9	317	19
Psychiatric aides	95	20.7	1.4	13.9	20	1
Occupational therapy assistants and aides[2]	19	10.6	2.5	24.7	2	([1])
Pharmacy aides[2]	61	12.4	2.5	24.5	8	2
Physical therapy assistants and aides	82	10.6	2.5	24.7	11	2
All other health service workers	185	15.5	2.3	23.4	32	4
Personal service occupations	2,934	22.0	1.8	17.6	745	52
Amusement and recreation attendants	337	33.9	1.8	18.3	132	6
Baggage porters and bellhops[2]	40	22.9	1.8	18.3	10	1
Child care workers	905	29.8	1.0	9.8	305	9
Barbers, cosmetologists, and related workers	723	10.0	2.6	25.9	76	19
Barbers	54	3.7	2.8	28.1	2	2
Hairdressers, hairstylists, and cosmetologists	605	10.5	2.6	25.8	67	16
Manicurists	49	10.5	2.6	25.8	6	1
Shampooers	15	10.5	2.6	25.8	2	([1])
Flight attendants	99	2.1	2.1	21.4	2	2
Personal care and home health aides[2]	746	21.4	1.8	17.9	206	13
Ushers, lobby attendants, and ticket takers[2]	84	22.9	1.8	18.3	21	2
Private household workers	928	33.4	3.0	29.7	280	28
Child care workers, private household	306	44.7	4.6	45.7	115	14
Cleaners and servants, private household[2]	600	27.8	2.2	21.8	157	13
Cooks, private household[2]	5	27.8	2.2	21.8	1	([1])
Housekeepers and butlers[2]	17	27.8	2.2	21.8	4	([1])
Protective service occupations	2,769	12.6	2.8	27.9	394	77
Fire fighting occupations	314	5.5	2.6	26.4	18	8
Firefighters	239	3.6	2.5	24.6	9	6
Fire fighting and prevention supervisors[2]	60	13.5	3.3	33.4	9	2
Fire inspection occupations	15	4.1	2.6	26.4	1	([1])
Law enforcement occupations	1,147	8.1	2.5	25.2	107	29
Correctional officers	383	10.9	2.7	27.4	50	11
Police and detectives	727	6.9	2.5	24.8	57	18
Detectives and criminal investigators	79	7.3	2.7	26.6	6	2
Police and detective supervisors	111	10.8	2.9	29.0	13	3

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Police patrol officers	446	7.3	2.7	26.6	38	12
Sheriffs and deputy sheriffs	91	0.0	0.9	9.2	(1)	1
Other law enforcement occupations	37	2.3	1.1	11.1	1	(1)
Other protective service workers	1,308	18.2	3.1	30.6	270	40
Crossing guards[2]	54	17.6	2.9	29.2	10	2
Guards	1,027	19.4	2.5	24.9	227	26
Private detectives and investigators	61	19.4	2.5	24.9	13	2
All other protective service workers	166	11.0	6.8	68.3	20	11
All other service workers[2]	1,249	21.6	2.4	24.4	295	30
Agriculture, forestry, fishing, and related occupations	4,435	16.4	2.3	23.3	735	104
Farm operators and managers	1,483	10.4	1.6	15.6	145	23
Farmers	1,308	10.9	1.5	15.5	133	20
Farm managers	175	6.6	1.7	16.8	11	3
Farm workers	851	19.1	3.1	30.7	157	26
Fishers and fishing vessel operators	51	23.1	2.0	19.8	10	1
Captains and other officers, fishing vessels[2]	11	23.1	2.0	19.8	2	(1)
Fishers[2]	40	23.1	2.0	19.8	8	1
Forestry, conservation, and logging occupations	120	15.2	2.2	22.5	18	3
Forest and conservation workers[2]	33	16.0	2.2	22.0	5	1
Timber cutting and logging occupations	87	14.9	2.3	22.7	13	2
Fallers and buckers	18	14.3	2.5	25.3	2	(1)
Logging equipment operators	56	15.3	2.1	21.2	8	1
All other timber cutting and related logging workers	13	14.3	2.5	25.3	2	(1)
Landscaping, groundskeeping, nursery, greenhouse, and lawn service occupations	1,285	20.0	2.8	28.2	284	36
Laborers, landscaping and groundskeeping	1,130	20.8	3.0	29.8	260	34
Lawn service managers[2]	86	9.1	0.8	7.9	9	1
Nursery and greenhouse managers[2]	5	9.1	0.8	7.9	1	(1)
Pruners	45	20.8	3.0	29.8	10	1
Sprayers/applicators	19	22.5	2.9	29.0	5	1
Supervisors, farming, forestry, and agricutural related occupations[2]	92	11.9	1.4	13.7	11	1
Veterinary assistants and nonfarm animal caretakers	181	26.6	1.4	14.4	54	3
Animal caretakers, except farm	137	26.6	1.4	14.4	40	2
Veterinary assistants	45	26.6	1.4	14.4	14	1
All other agricultural, forestry, fishing, and related workers[2]	373	18.8	2.9	28.7	71	11
Precision production, craft, and repair occupations	15,619	12.2	2.4	23.6	1,982	368
Blue-collar worker supervisors[2]	2,198	8.6	2.8	27.6	196	61
Construction trades	4,628	15.0	2.2	22.4	723	103
Boilermakers	18	11.2	2.4	24.4	2	(1)
Bricklayers, blockmasons, and stonemasons[2]	157	16.7	2.0	20.4	28	3
Carpenters	1,071	20.6	2.7	26.8	229	29
Carpet, floor, and tile installers and finishers	138	14.1	2.3	23.2	20	3
Carpet installers	85	12.7	2.2	21.8	11	2
Hard tile setters[2]	29	17.0	2.6	25.7	5	1
All other carpet, floor, and tile installers and finishers	25	15.7	2.5	25.2	4	1
Ceiling tile installers and acoustical carpenters	16	20.6	2.7	26.8	3	(1)
Concrete finishers, cement masons, and terrazzo workers	139	9.2	1.2	11.9	13	2
Construction equipment operators	321	10.9	1.6	15.9	36	5
Grader, bulldozer, and scraper operators	122	4.0	0.8	7.9	5	1
Operating engineers	126	14.2	1.8	17.9	19	2
Paving, surfacing, and tamping equipment operators[2]	74	16.7	2.6	25.7	13	2
Drywall installers and finishers	163	18.7	1.3	13.4	32	2
Electricians	656	12.5	2.0	20.5	86	13
Elevator installers and repairers	30	15.0	2.5	25.3	5	1
Glaziers[2]	44	16.7	2.6	25.7	8	1
Hazardous materials removal workers	38	11.5	2.4	23.7	5	1
Highway maintenance workers	155	11.5	2.4	23.7	19	4
Insulation workers	67	9.4	3.2	32.3	7	2
Painters and paperhangers	476	16.6	2.6	25.6	82	12

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Pipelayers and pipelaying fitters[2]	57	11.5	2.4	23.7	7	1
Plasterers and stucco masons[2]	40	16.7	2.6	25.7	7	1
Plumbers, pipefitters, and steamfitters	426	12.8	1.2	12.5	56	5
Roofers	158	16.1	3.4	34.3	27	5
Sheet metal workers and duct installers	230	7.9	2.5	24.6	19	6
Structural and reinforcing metal workers	81	16.3	2.6	26.5	14	2
All other construction trades workers[2]	146	11.5	2.4	23.7	17	3
Extractive and related workers, including blasters	244	6.8	2.5	25.0	17	6
Oil and gas extraction occupations	69	5.9	2.5	25.0	4	2
Roustabouts, oil and gas[2]	30	5.9	2.5	25.0	2	1
All other oil and gas extraction occupations[2]	40	5.9	2.5	25.0	2	1
Mining, quarrying, and tunneling occupations[2]	23	5.9	2.5	25.0	1	1
All other extraction and related workers[2]	152	7.3	2.5	25.1	12	4
Mechanics, installers, and repairers	5,176	11.5	2.4	23.9	629	123
Electrical and electronic equipment mechanics, installers, and repairers	409	10.0	2.5	25.1	44	10
Computer, automated teller, and office machine repairers	138	11.0	1.7	17.2	18	2
Data processing equipment repairers	79	16.7	1.4	14.2	16	1
Office machine and cash register servicers	58	3.2	2.1	21.3	2	1
Telecommunications equipment mechanics, installers, and repairers	125	8.0	3.1	31.0	11	4
Radio mechanics	7	11.6	2.8	28.2	1	([1])
Telephone equipment installers and repairers	69	6.2	3.2	32.5	4	2
Central office and PBX installers and repairers[2]	44	6.2	3.2	32.5	3	1
Station installers and repairers, telephone[2]	24	6.2	3.2	32.5	1	1
All other telecommunications equipment mechanics, installers, and repairers[2]	49	10.1	2.9	29.4	5	1
Miscellaneous electrical and electronic equipment mechanics, installers, and repairers	146	10.7	2.8	27.7	16	4
Electronic home entertainment equipment repairers	36	11.6	2.8	28.2	4	1
Electronics repairers, commercial and industrial equipment	72	11.6	2.8	28.2	9	2
All other electrical and electronic equipment mechanics, installers, and repairers	39	8.0	2.6	26.4	3	1
Machinery mechanics, installers, and repairers	1,850	11.0	2.3	22.6	210	42
Industrial machinery mechanics[2]	535	6.3	2.3	22.5	34	12
Maintenance repairers, general utility	1,232	13.4	2.2	22.4	171	28
Millwrights	82	6.2	2.7	27.1	5	2
Vehicle and mobile equipment mechanics and repairers	1,612	11.5	2.5	24.8	197	40
Aircraft mechanics and service technicians[2]	133	7.1	2.0	20.0	10	3
Automotive body and related repairers	227	12.0	2.9	29.2	29	7
Automotive mechanics and service technicians	790	12.4	2.5	24.9	106	20
Bus and truck mechanics and diesel engine specialists	255	7.1	2.2	21.9	19	6
Farm equipment mechanics[2]	49	15.8	2.6	26.1	8	1
Mobile heavy equipment mechanics	106	15.8	2.6	26.1	18	3
Motorcycle, boat, and small engine mechanics	52	14.6	2.6	25.8	8	1
Motorcycle mechanics[2]	14	14.6	2.6	25.8	2	([1])
Small engine mechanics[2]	38	14.6	2.6	25.8	6	1
Other mechanics, installers, and repairers	1,305	12.7	2.4	24.1	178	31
Bicycle repairers	11	13.4	2.2	22.4	2	([1])
Camera and photographic equipment repairers[2]	9	15.0	2.5	25.3	1	([1])
Coin, vending, and amusement machine servicers and repairers	27	13.4	2.2	22.4	4	1
Heating, air conditioning, and refrigeration mechanics and installers	286	8.0	1.8	18.5	25	5
Home appliance and power tool repairers[2]	51	14.1	3.0	29.6	7	2
Line installers and repairers	279	5.9	2.9	29.3	18	8
Electrical powerline installers and repairers[2]	99	5.5	2.3	23.4	6	2
Telephone and cable TV line installers and repairers	180	6.2	3.2	32.5	13	6
Locksmiths and safe repairers[2]	27	15.0	2.5	25.3	4	1
Medical equipment repairers	11	13.4	2.2	22.4	2	([1])
Musical instrument repairers and tuners[2]	13	15.0	2.5	25.3	2	([1])
Precision instrument repairers[2]	33	15.0	2.5	25.3	5	1
Riggers	11	13.4	2.2	22.4	2	([1])
Tire repairers and changers	83	28.8	4.4	43.8	25	4
Watch repairers[2]	8	15.0	2.5	25.3	1	([1])
All other mechanics, installers, and repairers[2]	455	16.2	2.0	20.2	79	9

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Production occupations, precision	2,971	12.8	2.1	21.2	383	63
Assemblers, precision	422	15.4	2.3	22.8	66	10
Aircraft assemblers, precision[2]	17	11.2	2.4	24.4	2	([1])
Electrical and electronic equipment assemblers, precision	201	18.1	2.2	21.8	38	4
Electromechanical equipment assemblers, precision	50	18.1	2.2	21.8	9	1
Fitters, structural metal, precision[2]	17	11.2	2.4	24.4	2	([1])
Machine builders and other precision machine assemblers[2]	74	11.2	2.4	24.4	8	2
All other precision assemblers[2]	64	11.4	2.4	24.4	7	2
Food workers, precision	310	11.5	2.3	22.6	35	7
Bakers, manufacturing	55	19.1	1.2	12.5	11	1
Butchers and meatcutters	216	8.7	2.4	23.7	18	5
All other precision food and tobacco workers[2]	39	16.8	3.1	31.0	7	1
Inspectors, testers, and graders, precision	689	14.1	2.2	22.2	96	15
Metal workers, precision[2]	707	9.8	2.0	20.5	71	14
Jewelers and precious stone and metal workers[2]	30	11.2	2.4	24.4	3	1
Machinists	426	9.0	2.0	19.9	40	8
Numerical control machine tool programmers	8	7.5	2.7	27.4	1	([1])
Shipfitters[2]	9	11.2	2.4	24.4	1	([1])
Tool and die makers	138	11.2	1.9	18.5	15	3
All other precision metal workers[2]	97	10.7	2.3	23.4	11	2
Printing workers, precision	138	16.2	1.8	17.8	22	2
Bookbinders[2]	7	16.5	2.7	27.5	1	([1])
Prepress printing workers, precision	115	16.2	1.7	17.4	18	2
Camera operators[2]	9	16.3	1.7	17.1	1	([1])
Compositors and typesetters, precision[2]	14	16.3	1.7	17.1	2	([1])
Desktop publishing specialists[2]	26	16.3	1.7	17.1	6	([1])
Film strippers, printing[2]	23	16.3	1.7	17.1	3	([1])
Job printers	17	15.4	1.9	19.1	3	([1])
Paste-up workers[2]	9	16.3	1.7	17.1	1	([1])
Photoengravers[2]	3	16.3	1.7	17.1	([1])	([1])
Platemakers[2]	15	16.3	1.7	17.1	2	([1])
All other printing workers, precision[2]	17	16.3	1.7	17.1	3	([1])
Textile, apparel, and furnishings workers, precision	234	10.0	2.0	19.7	23	5
Custom tailors and sewers	74	9.0	1.9	18.8	6	1
Patternmakers and layout workers, fabric and apparel[2]	16	8.1	2.0	19.9	1	([1])
Shoe and leather workers and repairers, precision[2]	23	8.1	2.0	19.9	2	([1])
Upholsterers[2]	66	8.1	2.1	20.6	5	1
All other precision textile, apparel, and furnishings workers[2]	55	14.9	2.0	19.6	8	1
Woodworkers, precision	229	14.7	1.5	15.2	34	3
Cabinetmakers and bench carpenters	123	15.3	1.1	11.4	19	1
Furniture finishers[2]	38	13.4	2.4	24.4	5	1
Wood machinists	40	15.3	1.1	11.4	6	([1])
All other precision woodworkers[2]	27	13.4	2.4	24.4	4	1
Other precision workers	242	14.2	2.5	24.9	36	6
Dental laboratory technicians, precision	44	7.6	1.9	19.3	3	1
Ophthalmic laboratory technicians	23	6.3	1.2	12.4	1	([1])
Photographic process workers, precision	18	23.2	4.0	39.7	4	1
All other precision workers	157	16.1	2.6	26.5	27	4
Plant and system occupations	403	7.6	2.9	29.0	32	12
Chemical plant and system operators[2]	43	6.6	3.2	32.0	3	1
Electric power generating plant operators, distributors, and dispatchers	45	6.6	3.2	32.0	3	1
Power distributors and dispatchers[2]	14	6.6	3.2	32.0	1	([1])
Power generating and reactor plant operators[2]	31	6.6	3.2	32.0	2	1
Gas and petroleum plant and system occupations[2]	38	6.6	3.2	32.0	2	1
Stationary engineers	31	6.2	2.1	21.3	2	1
Water and liquid waste treatment plant and system operators	98	10.8	2.3	23.2	11	2
All other plant and system operators[2]	148	6.6	3.2	32.0	10	5
Operators, fabricators, and laborers	18,588	19.2	2.3	23.2	3,734	430
Machine setters, set-up operators, operators, and tenders	5,139	14.9	2.1	21.0	774	108

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Numerical control machine tool operators and tenders, metal and plastic[2]	88	17.3	2.2	22.1	17	2
Combination machine tool setters, set-up operators, operators, and tenders, metal and plastic[2]	107	17.3	2.2	22.1	20	2
Machine tool cut and form setters, operators, and tenders, metal and plastic	726	11.5	2.4	23.6	82	17
Drilling and boring machine tool setters and set-up operators, metal and plastic[2]	42	17.3	2.2	22.1	7	1
Grinding, lapping, and buffing machine tool setters and set-up operators, metal and plastic	75	5.6	2.7	26.9	4	2
Lathe and turning machine tool setters and set-up operators, metal and plastic[2]	72	17.3	2.2	22.1	12	2
Machine forming operators and tenders, metal and plastic	163	9.9	2.5	24.9	16	4
Machine tool cutting operators and tenders, metal and plastic	109	5.9	2.5	25.3	6	3
Punching machine setters and set-up operators, metal and plastic	47	12.4	2.0	20.1	6	1
All other machine tool setters, set-up operators, metal and plastic[2]	218	14.4	2.2	22.2	32	5
Metal fabricating machine setters, operators, and related workers	167	12.0	2.4	24.3	21	4
Metal fabricators, structural metal products[2]	46	17.3	2.2	22.1	8	1
Soldering and brazing machine operators and tenders[2]	12	18.5	2.3	23.3	2	([1])
Welding machine setters, operators, and tenders	110	9.1	2.5	25.3	10	3
Metal and plastic processing machine setters, operators, and related workers	478	9.9	2.4	24.5	50	12
Electrolytic plating machine setters, set-up operators, operators, and tenders, metal and plastic[2]	45	9.9	2.5	24.9	5	1
Foundry mold assembly and shake out workers	9	9.9	2.5	24.9	1	([1])
Furnace operators and tenders[2]	23	10.0	1.6	15.7	2	([1])
Heat treating, annealing, and tempering machine operators and tenders, metal and plastic[2]	23	9.9	2.5	24.9	2	1
Metal molding machine setters, set-up operators, operators, and tenders	58	9.9	2.5	24.9	6	1
Plastic molding machine setters, set-up operators, operators, and tenders	171	9.9	2.5	24.9	18	4
All other metal and plastic machine setters, operators, and related workers[2]	148	9.9	2.5	24.9	16	4
Printing, binding, and related workers	406	15.0	2.0	20.1	61	8
Bindery machine operators and set-up operators[2]	90	16.3	1.7	17.1	15	2
Prepress printing workers, production[2]	20	16.3	1.7	17.1	3	([1])
Photoengraving and lithographic machine operators and tenders[2]	7	16.3	1.7	17.1	1	([1])
Typesetting and composing machine operators and tenders[2]	13	16.3	1.7	17.1	2	([1])
Printing press operators	225	14.3	2.2	21.7	32	5
Letterpress operators	10	14.3	2.2	21.7	1	([1])
Offset lithographic press operators	63	14.3	2.2	21.7	8	1
Printing press machine setters, operators and tenders	142	14.3	2.2	21.7	21	3
All other printing press setters and set-up operators[2]	10	14.3	2.2	21.7	1	([1])
Screen printing machine setters and set-up operators	28	14.3	2.2	21.7	4	1
All other printing, binding, and related workers	43	15.7	1.8	18.4	7	1
Textile and related setters, operators, and related workers	851	13.9	1.5	14.9	107	13
Extruding and forming machine operators and tenders, synthetic or glass fibers[2]	33	17.2	1.6	16.5	6	1
Pressing machine operators and tenders, textile, garment, and related materials	69	15.2	1.7	16.6	10	1
Sewing machine operators, garment	369	13.5	1.4	13.7	42	5
Sewing machine operators, non-garment	137	13.5	1.4	13.7	19	2
Textile bleaching and dyeing machine operators and tenders[2]	24	17.2	1.6	16.5	4	([1])
Textile draw-out and winding machine operators and tenders[2]	192	13.6	1.7	16.6	23	3
Textile machine setters and set-up operators	28	13.4	1.7	16.7	4	([1])
Woodworking machine setters, operators, and other related workers	143	32.9	2.6	26.0	45	4
Head sawyers and sawing machine operators and tenders, setters and set-up operators	64	37.5	2.9	29.4	24	2
Woodworking machine operators and tenders, setters and set-up operators[2]	79	29.1	2.3	23.2	21	2
Other machine setters, set-up operators, operators, and tenders	2,172	16.4	2.1	21.2	373	46
Boiler operators and tenders, low pressure[2]	16	6.2	2.1	21.3	1	([1])
Cement and gluing machine operators and tenders[2]	32	17.6	2.4	23.7	5	1
Chemical equipment controllers, operators and tenders[2]	100	17.6	2.4	23.7	19	2
Cooking and roasting machine operators and tenders, food and tobacco[2]	31	13.0	1.8	18.3	4	1
Crushing, grinding, mixing, and blending machine operators and tenders	150	17.6	2.3	23.5	27	4
Cutting and slicing machine setters, operators and tenders	96	17.9	2.4	24.1	18	2
Dairy processing equipment operators, including setters	15	17.6	2.4	23.7	2	([1])
Electronic semiconductor processors	63	10.0	1.5	14.8	8	1
Extruding and forming machine setters, operators and tenders[2]	126	17.6	2.4	23.7	23	3
Furnace, kiln, oven, drier, or kettle operators and tenders[2]	25	10.0	1.6	15.7	2	([1])

See footnotes at end of table.

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Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-96	Net, 1998-2008		Total	Net
			Annual average	10-year		
Laundry and dry-cleaning machine operators and tenders, except pressing	167	20.8	2.5	24.5	36	4
Motion picture projectionists[2]	9	17.6	2.4	23.7	1	([1])
Packaging and filling machine operators and tenders	377	20.8	2.6	26.0	83	10
Painting and coating machine operators	171	18.8	2.2	21.8	34	4
Coating, painting, and spraying machine operators, tenders, setters, and set-up operators	129	18.8	2.2	21.8	25	3
Painters, transportation equipment	42	18.8	2.2	21.8	8	1
Paper goods machine setters and set-up operators[2]	62	15.4	2.1	21.1	9	1
Photographic processing machine operators and tenders	46	23.2	4.0	39.7	10	2
Separating, filtering, clarifying, precipitating, and still machine operators and tenders[2]	28	17.6	2.4	23.7	5	1
Shoe sewing machine operators and tenders[2]	7	13.5	1.8	18.4	1	([1])
Tire building machine operators	18	10.0	1.5	14.8	2	([1])
All other machine operators, tenders, setters, and set-up operators[2]	635	12.0	1.5	14.9	82	9
Hand workers, including assemblers and fabricators	3,092	18.7	2.1	21.5	606	66
Cannery workers	50	20.8	2.6	26.0	10	1
Coil winders, tapers, and finishers	22	22.2	1.8	17.9	5	([1])
Cutters and trimmers, hand[2]	42	18.5	2.3	23.3	7	1
Electrical and electronic assemblers	246	22.2	1.8	17.9	57	4
Grinders and polishers, hand	81	15.8	2.7	26.9	13	2
Machine assemblers	67	22.2	1.8	17.9	15	1
Meat, poultry, and fish cutters and trimmers, hand[2]	143	18.5	2.3	23.3	30	3
Painting, coating, and decorating workers, hand[2]	39	18.5	2.3	23.3	8	1
Pressers, hand	13	15.8	2.7	26.9	2	([1])
Sewers, hand	10	9.0	1.9	18.8	1	([1])
Solderers and brazers	35	18.5	2.3	23.3	7	1
Welders and cutters	368	9.1	2.5	25.3	35	9
All other assemblers, fabricators, and hand workers[2]	1,976	20.1	2.1	20.8	417	41
Transportation and material moving machine and vehicle operators	5,215	14.1	1.6	16.3	790	85
Motor vehicle operators	4,084	14.1	1.5	15.4	620	63
Bus drivers	638	12.2	1.8	17.9	84	11
Bus drivers, transit and intercity	203	12.2	1.8	17.9	27	4
Bus drivers, school	435	12.2	1.8	17.9	57	8
Taxi drivers and chauffeurs	132	16.7	1.6	16.4	24	2
Truck drivers	3,274	14.3	1.5	14.9	506	49
Driver/sales workers	305	6.8	2.0	19.9	21	6
Truck drivers light and heavy	2,970	15.1	1.4	14.4	486	43
All other motor vehicle operators[2]	40	15.1	1.7	17.4	6	1
Rail transportation workers	85	6.6	3.4	34.2	5	3
Locomotive engineers[2]	33	6.6	3.4	34.2	2	1
Railroad brake, signal, and switch operators	14	6.6	3.4	34.2	1	([1])
Railroad conductors and yardmasters[2]	25	6.6	3.4	34.2	2	1
Subway and streetcar operators[2]	3	6.6	3.4	34.2	([1])	([1])
All other rail transportation workers[2]	8	6.6	3.4	34.2	([1])	([1])
Water transportation and related workers	56	18.7	3.8	38.4	11	2
Able seamen, ordinary seamen, and marine oilers[2]	23	18.7	3.8	38.4	4	1
Captains and pilots, water vessels[2]	19	18.7	3.8	38.4	4	1
Mates, ship, boat, and barge[2]	8	18.7	3.8	38.4	2	([1])
Ship engineers[2]	6	18.7	3.8	38.4	1	([1])
Material moving equipment operators	808	14.6	1.7	16.5	123	13
Crane and tower operators	49	12.6	2.3	22.6	6	1
Excavation and loading machine operators[2]	106	4.0	1.9	18.8	5	2
Hoist and winch operators[2]	11	14.2	1.8	17.9	2	([1])
Industrial truck and tractor operators	415	17.7	1.2	11.8	77	5
All other material moving equipment operators[2]	228	14.3	2.3	22.6	34	5
All other transportation and material moving equipment operators[2]	183	15.2	1.9	19.4	31	4
Helpers, laborers, and material movers, hand	5,142	28.8	3.3	33.3	1,573	171
Cleaners of vehicles and equipment	288	33.9	3.2	31.6	110	9
Freight, stock, and material movers, hand[2]	822	36.9	3.7	36.7	305	30
Hand packers and packagers	984	20.9	2.5	24.7	228	24

See footnotes at end of table.

Table 10. Total and net replacement rates and annual average replacement needs, 1998-2008 — Continued

(Numbers in thousands)

1998 Matrix occupation	Total employment, 1998	Replacement rate (Percent)			Annual average replacement needs, 1998-2008	
		Total, 1995-98	Net, 1998-2008		Total	Net
			Annual average	10-year		
Helpers, construction trades	576	27.3	4.6	46.0	163	26
Machine feeders and offbearers	213	19.0	3.0	30.2	40	6
Parking lot attendants[2]	98	18.1	1.7	17.4	18	2
Refuse and recyclable material collectors[2]	99	37.9	3.9	38.7	38	4
Service station attendants	141	28.8	4.4	43.8	40	6
All other helpers, laborers, and material movers, hand[2]	1,934	30.4	3.3	32.7	628	63

[1] Less than 500
[2] One or more Current Population Survey (CPS) based occupations may be used to estimate CPS based data. See Chapter 2.

Chapter V. Education and Training Statistics

Nearly 3 million postsecondary degrees were earned during the 1996-97 academic year: 565,000 associate degrees, 1.2 million bachelor's degrees, 414,000 master's degrees, 45,000 doctoral degrees, and 78,000 first professional degrees.

Table 11 presents data on the number of awards and degrees earned during 1996-97 by type of educational program and detailed field of study. Data covering the period from July 1, 1996, to June 30, 1997, were provided by the National Center for Education Statistics (NCES), U. S. Department of Education, from the survey *Completions 1996-97* of its Integrated Postsecondary Education Data System (IPEDS). The NCES surveyed all institutions of higher education that offer awards at the bachelor's degree level and higher, all institutions with 2-year programs, and all public and private institutions with programs of less than 2 years. The 1990 version of the *Classification of Instructional Programs* was used to categorize the data.[1]

Nondegree formal awards for the completion of 1- to 4-year curriculums totaled 297,000 during the 1996-97 academic year, while awards earned for the completion of programs of less than 1 year numbered 285,000. The majority of both types of awards were earned in personal and miscellaneous services, health professions and related services, and business management and services.

Associate degrees earned totaled 565,000, up nearly 27 percent from 10 years earlier. Almost 60 percent were earned in the three largest discipline divisions: general liberal arts studies, health professions, and business management. NCES projects the number of earned associate degrees to rise to 579,000 by 2007-08, an increase of 9 percent from 1995-96.

A total of 1,180,000 bachelor's degrees were earned during 1996-97, an increase of 20 percent from the 1986-87 academic year. About 40 percent were earned in the three largest discipline divisions: business management, education, and social sciences. Over the 1985-86 to 1995-96 period, the divisions with the largest increases in degrees earned were social sciences and history (up 32,600), psychology (32,700), and English language and literature/letters (16,100). The largest decreases in bachelor's degrees earned were in engineering (down 14,100) and computer and information sciences (17,800). NCES projects the number of earned bachelor's degrees to rise to 1,270,000 by the 2007-08 academic year, an increase of 9 percent from 1996-97.

Some 415,0000 master's degrees were granted in 1996-97, some 44 percent more than in 1986-87. Nearly 60 percent were earned in education, business management, and health professions. Nearly all discipline divisions experienced increases in degrees earned over the period 1985-86 to 1995-96, but the largest increases were in business (up 27,300), education (31,500), and health sciences and related professions (14,800). NCES projects the number of earned master's degrees to increase to 446,000 by the 2007-08 academic year, an increase of almost 12 percent from 1995-96.

Doctoral degrees totaled about 45,000 during 1996-97, up more than 34 percent from 10 years earlier. Nearly 40 percent were earned in education, engineering, and the biological and life sciences. Almost all discipline divisions experienced increases in degrees earned in the period 1985-86 to 1995-96, but the largest increases were in engineering (up 3,000), biological and life sciences (1, 400), and phyaical sciences (1,000). NCES projects the number of earned doctoral degrees to grow to 49,500 by the 2007-08 academic year, an increase of less than 12 percent from 1995-96.

About 78,000 first professional degrees were earned during 1996-97, barely 6 percent more than in the 1986-87 academic year. All were earned in law, health professions, and theology and religious vocational studies. NCES projects the number of earned first professional degrees to decrease slightly to 75,000 by the 2007-08 academic year.

Postsecondary education data are now available on the Internet through either the U.S. Department of Education/OERI gopher server (**gopher://gopher.ed.gov**) under the menu item NCES Data, or through the U.S. Department of Education World Wide Web server. Access the NCES site (**http://www.ed.gov/NCES**) for the *Digest of Education Statistics*, IPEDS data back to 1989-90, and data from other statistical series.

[1] *Classification of Instructional Programs*, 1990 ed. (National Center for Education Statistics, August 1991).

Table 11. Earned awards and degrees, by field of study, 1996-97

Classification of Instructional Programs (CIP) codes and titles	Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First profes-sional degrees
Total, all programs	285,329	297,142	565,105	1,179,243	414,240	45,400	77,758
01. Agricultural business and production	2,800	2,137	4,171	5,114	616	181	-
01.01 Agricultural business and management	506	609	873	3,381	468	137	-
01.0101 Agricultural business and management, general	107	94	506	915	73	-	-
01.0102 Agricultural business/agribusiness operations	23	54	185	1,177	34	-	-
01.0103 Agricultural economics	-	6	7	1,074	361	137	-
01.0104 Farm and Ranch Management	376	452	111	95	-	-	-
01.0199 Agricultural business and management, other	-	3	64	120	-	-	-
01.02 Agricultural mechanization	313	260	246	274	4	-	-
01.0201 Agricultural mechanization, general	5	94	131	254	3	-	-
01.0204 Agricultural power machinery operator	301	135	112	-	-	-	-
01.0299 Agricultural mechanization, other	7	31	3	20	1	-	-
01.03 Agricultural production workers and managers	60	188	754	149	48	14	-
01.0301 Agricultural production workers and managers, general	12	86	357	42	4	-	-
01.0302 Agricultural animal husbandry and production management	37	91	287	40	3	-	-
01.0303 Aquaculture operations and production management	11	9	20	67	32	13	-
01.0304 Crop production operations and management	-	-	68	-	7	1	-
01.0399 Agricultural production workers and managers, other	-	2	22	-	2	-	-
01.04 Agricultural and food products processing	68	17	42	88	13	17	-
01.05 Agricultural supplies and related services	238	56	390	177	4	-	-
01.0501 Agricultural and supplies retailing and wholesaling	-	-	169	69	-	-	-
01.0505 Animal trainer	15	15	52	-	-	-	-
01.0507 Equestrian/equine studies, horse management and training	75	21	151	108	4	-	-
01.0599 Agricultural supplies and related services, other	148	20	18	-	-	-	-
01.06 Horticulture services operations and management	1,615	985	1,807	639	32	11	-
01.0601 Horticulture services operations and management, general	578	388	589	156	21	6	-
01.0603 Ornamental horticulture operations and management	113	161	408	272	11	-	-
01.0604 Greenhouse operations and management	40	20	47	-	-	-	-
01.0605 Landscaping operations and management	136	323	300	150	-	-	-
01.0606 Nursery operations and management	721	34	70	-	-	-	-
01.0607 Turf management	26	48	354	40	-	-	-
01.0699 Horticulture services operations and management, other	1	11	39	21	-	5	-
01.07 International agriculture	-	-	-	20	13	-	-
01.99 Agricultural business and production, other	-	22	59	386	34	2	-
01.9999 Agricultural business and production, other	-	22	59	386	34	2	-
02. Agricultural sciences	142	73	878	7,958	1,634	689	-
02.01 Agriculture/agricultural sciences	3	25	388	1,144	178	-	-
02.0101 Agriculture/agricultural sciences, general	3	25	388	1,114	171	-	-
02.0102 Agricultural extension	-	-	-	30	7	-	-
02.02 Animal sciences	61	35	326	3,777	430	182	-
02.0201 Animal sciences, general	50	19	153	3,225	326	133	-
02.0202 Agricultural animal breeding and genetics	-	-	3	41	11	13	-
02.0203 Agricultural animal health	-	-	52	7	7	-	-
02.0204 Agricultural animal nutrition	-	-	-	-	8	6	-
02.0205 Agricultural animal physiology	-	-	-	-	2	3	-
02.0206 Dairy science	-	11	7	78	23	6	-
02.0209 Poultry	11	4	33	145	25	10	-
02.0299 Animal sciences, other	-	1	78	281	28	11	-
02.03 Food sciences and technology	41	6	18	562	318	171	-
02.04 Plant sciences	37	7	93	2,058	555	262	-
02.0401 Plant sciences, general	-	-	5	395	68	31	-
02.0402 Agronomy and crop science	33	-	17	690	220	127	-
02.0403 Horticulture science	4	7	61	657	121	49	-
02.0405 Plant breeding and genetics	-	-	-	-	16	17	-
02.0406 Agricultural plant pathology	-	-	-	5	9	7	-
02.0407 Agricultural plant physiology	-	-	-	-	-	5	-
02.0408 Plant protection (pest management)	-	-	9	33	24	1	-
02.0409 Range science and management	-	-	1	144	58	19	-
02.0499 Plant sciences, other	-	-	-	134	39	6	-
02.05 Soil sciences	-	-	1	176	93	62	-
02.99 Agriculture/agricultural sciences, other	-	-	52	241	60	12	-
03. Conservation and renewable natural resources	245	173	1,440	9,701	2,300	346	-
03.01 Natural resources conservation	2	67	326	5,511	1,257	117	-

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Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
03.0101	Natural resources conservation, general	2	53	272	1,708	413	58	-
03.0102	Environmental Science/Studies	-	14	54	3,803	844	59	-
03.02	Natural resources management and protective services	14	2	268	543	222	7	-
03.0201	Natural resources management and policy	-	1	104	467	217	1	-
03.0203	Natural resources law enforcement and protective services	1	-	36	-	-	-	-
03.0299	Natural resources management and protective services, other	13	1	128	76	5	6	-
03.03	Fishing and fisheries sciences and management	202	-	56	215	93	26	-
03.04	Forest production and processing	14	86	409	305	19	25	-
03.0401	Forest harvesting and production technology/technician	-	56	312	237	19	25	-
03.0404	Forest products technology/technician	1	24	36	17	-	-	-
03.0499	Forestry production and processing, other	13	6	61	51	-	-	-
03.05	Forestry and related sciences	12	15	163	1,475	471	132	-
03.0501	Forestry, general	8	5	85	819	331	85	-
03.0502	Forestry sciences	-	-	7	186	62	24	-
03.0506	Forest management	4	6	45	141	29	6	-
03.0509	Wood science and pulp/paper technology	-	4	20	133	18	4	-
03.0599	Forestry and related sciences, other	-	-	6	196	31	13	-
03.06	Wildlife and wildlands management	1	3	200	1,197	164	23	-
03.99	Conservation and renewable natural resources, other	-	-	18	455	74	16	-
04.	Architecture and related programs	9	40	316	7,952	4,025	135	-
04.02	Architecture	-	2	41	4,589	2,032	51	-
04.03	City/urban, community and regional planning	-	-	-	462	1,321	63	-
04.04	Architectural environmental design	-	-	-	693	74	4	-
04.05	Interior architecture	9	37	271	712	13	-	-
04.06	Landscape architecture	-	1	4	889	361	2	-
04.07	Architectural urban design and planning	-	-	-	-	69	7	-
04.99	Architecture and related programs, other	-	-	-	607	155	8	-
05.	Area, ethnic and cultural studies	170	114	94	5,842	1,653	182	-
05.01	Area studies	87	7	7	3,793	1,171	131	-
05.0101	African studies	1	-	-	31	13	2	-
05.0102	American studies/civilization	-	1	6	1,518	241	75	-
05.0103	Asian studies	20	-	-	466	111	-	-
05.0104	East Asian studies	-	3	-	371	148	18	-
05.0105	Eastern European area studies	-	-	-	11	9	1	-
05.0106	European studies	-	-	-	107	14	-	-
05.0107	Latin American studies	25	2	-	460	226	13	-
05.0108	Middle Eastern studies	6	-	-	85	86	18	-
05.0109	Pacific area studies	-	-	-	4	3	-	-
05.0110	Russian and Slavic area studies	15	-	-	181	100	-	-
05.0111	Scandinavian area studies	-	-	-	16	3	3	-
05.0112	South Asian studies	-	-	-	5	17	-	-
05.0113	Southeast Asian studies	-	-	-	7	22	-	-
05.0114	Western European studies	20	-	-	23	49	1	-
05.0115	Canadian studies	-	-	-	5	-	-	-
05.0199	Area studies, other	-	1	1	503	129	-	-
05.02	Ethnic and cultural studies	83	107	84	1,832	326	40	-
05.0201	Afro-American (Black) studies	11	18	13	558	66	9	-
05.0202	American Indian/Native American studies	-	4	29	66	33	-	-
05.0203	Hispanic-American studies	-	-	-	177	19	-	-
05.0204	Islamic studies	-	-	-	-	1	2	-
05.0205	Jewish/Judaic studies	6	48	2	146	103	9	-
05.0206	Asian-American studies	-	-	-	1	-	-	-
05.0207	Women's studies	66	22	6	606	71	5	-
05.0299	Ethnic and cultural studies, other	-	15	34	278	33	15	-
05.99	Area, ethnic, and cultural studies, other	-	-	3	217	156	11	-
08.	Marketing operations/marketing and distribution	6,312	2,601	5,730	4,598	586	2	-
08.01	Apparel and accessories marketing operations	23	149	1,809	1,026	4	-	-
08.0101	Apparel and accessories marketing operations, general	-	14	48	59	2	-	-
08.0102	Fashion merchandising	23	134	1,749	958	2	-	-
08.0199	Apparel and accessories marketing operations, other	-	1	12	9	-	-	-
08.02	Business and personal services marketing operations	5	33	116	249	-	-	-
08.0204	Business services marketing operations	-	2	20	-	-	-	-
08.0205	Personal services marketing operations	-	-	9	-	-	-	-
08.0299	Business and personal services marketing operations, other	5	31	87	249	-	-	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First profes-sional degrees
08.03	Entrepreneurship	71	86	55	166	111	-	-
08.04	Financial services marketing operations	25	-	12	20	-	-	-
08.05	Floristry marketing operations	191	471	19	-	-	-	-
08.06	Food products retailing and wholesaling operations	96	55	8	133	11	-	-
08.07	General retailing and wholesaling operations and skills	1,186	589	2,077	2,439	423	2	-
08.0701	Auctioneering	23	-	-	-	-	-	-
08.0704	General buying operations	63	36	83	29	-	-	-
08.0705	General retailing operations	305	199	628	109	-	-	-
08.0706	General selling skills and sales operations	441	126	295	429	4	-	-
08.0708	General marketing operations	88	143	572	1,704	419	2	-
08.0709	General distribution operations	54	2	27	5	-	-	-
08.0799	General retailing and wholesaling operations and skills, other	212	83	472	163	-	-	-
08.08	Home and office products marketing operations	49	15	-	10	-	-	-
08.0809	Home products marketing operations	49	10	-	10	-	-	-
08.0810	Office products marketing operations	-	-	-	-	-	-	-
08.0899	Home and office products marketing operations, other	-	5	-	-	-	-	-
08.09	Hospitality and recreation marketing operations	257	121	108	129	-	-	-
08.0901	Hospitality and recreation marketing operations, general	26	91	75	25	-	-	-
08.0902	Hotel/motel services marketing operations	69	27	5	-	-	-	-
08.0903	Recreational products/services marketing operations	-	2	25	92	-	-	-
08.0906	Food sales operations	162	1	-	12	-	-	-
08.0999	Hospitality and recreation marketing operations, other	-	-	3	-	-	-	-
08.10	Insurance marketing operations	648	1	24	-	-	-	-
08.11	Tourism and travel services marketing operations	3,539	976	1,164	230	26	-	-
08.1104	Tourism promotion operations	606	97	283	138	24	-	-
08.1105	Travel services marketing operations	1,324	295	462	4	1	-	-
08.1199	Tourism and travel services marketing operations, other	1,609	584	419	88	1	-	-
08.12	Vehicle and petroleum products marketing operations	3	52	93	62	-	-	-
08.1203	Vehicle parts and accessories marketing operations	3	46	60	-	-	-	-
08.1208	Vehicle marketing operations	-	-	33	61	-	-	-
08.1299	Vehicles and petroleum products marketing operations, other	-	6	-	1	-	-	-
08.13	Health products and services marketing operations	-	-	-	7	-	-	-
08.99	Marketing operations/marketing and distribution, other	219	53	245	127	11	-	-
09.	Communications	589	733	2,063	47,458	5,255	296	-
09.01	Communications, general	75	150	632	23,243	1,929	198	-
09.02	Advertising	27	79	412	2,757	266	2	-
09.04	Journalism and mass communications	3	18	448	11,877	1,693	52	-
09.0401	Journalism	3	13	296	8,667	1,448	20	-
09.0402	Broadcast journalism	-	5	124	522	2	-	-
09.0403	Mass communications	-	-	28	2,334	224	31	-
09.0499	Journalism and mass communications, other	-	-	-	354	19	1	-
09.05	Public relations and organizational communications	-	2	39	2,173	282	-	-
09.07	Radio and television broadcasting	329	363	263	5,049	323	19	-
09.99	Communications, other	155	121	269	2,359	762	25	-
10.	Communications technologies	1,455	558	1,761	583	374	4	-
10.01	Communications technology	1,455	558	1,761	583	374	4	-
10.0101	Educational/instructional media technology/technician	4	34	77	-	49	-	-
10.0103	Photographic technology/technician	79	29	180	8	-	-	-
10.0104	Radio and television broadcasting technology/technician	949	380	868	432	242	4	-
10.0199	Communications technologies/technicians, other	423	115	636	143	83	-	-
11.	Computer and information sciences	21,296	7,643	11,328	24,902	10,106	859	-
11.01	Computer and information sciences, general	4,837	968	3,051	15,649	6,921	657	-
11.02	Computer programming	2,576	2,641	2,575	277	18	-	-
11.03	Data processing technology/technician	6,550	1,374	1,842	127	-	-	-
11.04	Information science and systems	388	138	1,152	4,385	1,565	30	-
11.05	Computer systems analysis	3	69	119	226	40	3	-
11.07	Computer science	32	90	481	3,508	969	129	-
11.99	Computer and information sciences, other	6,910	2,363	2,108	730	593	40	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles	Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
12. Personal and miscellaneous services	25,217	49,874	7,967	210	23	-	-
12.02 Gaming and sports officiating services	418	369	7	-	-	-	-
12.0203 Card dealer	402	369	-	-	-	-	-
12.0299 Gaming and sports officiating services, other	16	-	7	-	-	-	-
12.03 Funeral services and mortuary science	41	686	1,184	110	-	-	-
12.04 Cosmetic services	22,880	45,332	244	1	-	-	-
12.0401 Cosmetic services, general	1,389	169	4	-	-	-	-
12.0402 Barber/Hairstylist	255	2,308	-	-	-	-	-
12.0403 Cosmetologist	4,622	39,473	201	-	-	-	-
12.0404 Electrolysis technician	65	-	-	-	-	-	-
12.0405 Massage	4,291	1,204	39	1	-	-	-
12.0406 Make-up artist	6,166	501	-	-	-	-	-
12.0499 Cosmetic services, other	6,092	1,677	-	-	-	-	-
12.05 Culinary arts and related services	1,620	3,482	6,517	99	2	-	-
12.0501 Baker/pastry chef	135	236	264	-	-	-	-
12.0502 Bartender/mixologist	448	-	-	-	-	-	-
12.0503 Culinary arts/chef training	779	2,124	4,477	73	-	-	-
12.0504 Food and beverage/restaurant operations manager	16	65	397	26	-	-	-
12.0505 Kitchen personnel/cook and assistant training	37	153	10	-	-	-	-
12.0506 Meatcutter	-	551	5	-	-	-	-
12.0507 Waiter/waitress and dining room manager	-	41	-	-	-	-	-
12.0599 Culinary arts and related services, other	205	312	1,364	-	2	-	-
12.99 Personal and miscellaneous services, other	258	5	15	-	21	-	-
13. Education	1,033	788	10,586	106,868	110,375	6,825	-
13.01 Education, general	4	14	4,093	1,600	11,918	1,083	-
13.02 Bilingual/bicultural education	-	-	19	111	359	12	-
13.03 Curriculum and instruction	-	-	-	24	9,989	730	-
13.04 Education administration and supervision	79	1	20	182	12,110	2,385	-
13.0401 Education administration and supervision, general	32	-	7	2	8,605	1,736	-
13.0402 Administration of special education	-	-	-	-	8	2	-
13.0403 Adult and continuing education administration	-	-	-	10	165	70	-
13.0404 Educational supervision	-	-	-	-	745	16	-
13.0405 Elementary, middle and secondary education administration	-	-	11	169	1,620	64	-
13.0406 Higher education administration	-	-	-	-	474	330	-
13.0407 Community and junior college education administration	-	-	-	-	14	4	-
13.0499 Education administration and supervision, other	47	1	2	1	479	163	-
13.05 Educational/instructional media design	-	-	2	38	1,414	42	-
13.06 Educational evaluation, research and statistics	-	-	-	46	151	71	-
13.0601 Educational evaluation and research	-	-	-	43	61	13	-
13.0603 Educational statistics and research methods	-	-	-	3	20	20	-
13.0604 Educational assessment, testing and measurement	-	-	-	-	53	29	-
13.0699 Educational evaluation, research and statistics, other	-	-	-	-	17	9	-
13.07 International and comparative education	-	-	-	-	110	5	-
13.08 Educational psychology	-	-	-	117	1,421	449	-
13.09 Social and philosophical foundations of education	-	-	3	52	244	103	-
13.10 Special education, total	24	131	256	10,092	12,130	231	-
13.1001 Special education, general	24	8	96	7,101	9,776	209	-
13.1003 Education of the deaf and hearing impaired	-	12	32	261	189	-	-
13.1004 Education of the gifted and talented	-	-	-	2	179	-	-
13.1005 Education of the emotionally handicapped	-	-	-	345	229	4	-
13.1006 Education of the mentally handicapped	-	-	4	473	84	3	-
13.1007 Education of the multiple handicapped	-	-	-	113	263	1	-
13.1008 Education of the physically handicapped	-	-	4	67	78	1	-
13.1009 Education of the blind and visually handicapped	-	-	-	27	27	-	-
13.1011 Education of specific learning disabled	-	-	-	633	592	8	-
13.1012 Education of the speech impaired	-	-	-	715	241	-	-
13.1013 Education of the autistic	-	-	-	-	-	-	-
13.1099 Special education, other	-	111	120	355	472	5	-
13.11 Student counseling and personnel services	-	-	-	58	13,067	338	-
13.1101 Counselor education counseling and guidance services	-	-	-	58	12,676	332	-
13.1102 College/postsecondary student counseling and personnel services	-	-	-	-	391	6	-
13.12 General teacher education	121	169	2,845	59,315	26,394	411	-
13.1201 Adult and continuing teacher education	-	19	1	36	911	163	-
13.1202 Elementary teacher education	-	33	1,333	46,359	13,869	76	-
13.1203 Junior high/intermediate/middle school teacher education	-	-	-	1,458	718	-	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles	Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
13.1204 Pre-elementary/early childhood/kindergarten teacher education	121	116	1,013	6,551	2,080	25	-
13.1205 Secondary teacher education	-	1	390	4,193	4,991	64	-
13.1299 Teacher education, multiple levels	-	-	103	383	2,914	80	-
13.13 Teacher education, specific academic and vocational programs	88	46	607	34,011	16,216	781	-
13.1301 Agricultural teacher education (vocational)	-	-	17	500	240	50	-
13.1302 Art teacher education	5	-	17	1,521	652	24	-
13.1303 Business teacher education (vocational)	-	9	21	959	397	14	-
13.1304 Driver and safety teacher education	-	-	-	37	13	-	-
13.1305 English teacher education	-	-	20	2,468	811	15	-
13.1306 Foreign languages teacher education	-	2	1	301	311	21	-
13.1307 Health teacher education	40	6	27	2,131	792	58	-
13.1308 Home economics teacher education (vocational)	-	-	9	285	75	9	-
13.1309 Technology teacher education/industrial arts teacher education	3	-	43	1,171	357	12	-
13.1310 Marketing operations teacher education/marketing and distributive teacher education (vocational)	-	-	-	59	6	-	-
13.1311 Mathematics teacher education	-	-	5	1,568	836	47	-
13.1312 Music teacher education	-	2	23	2,829	747	79	-
13.1314 Physical education teaching and coaching	-	7	269	12,517	2,931	186	-
13.1315 Reading teacher education	-	-	5	155	3,923	65	-
13.1316 Science teacher education, general	-	-	11	1,154	682	45	-
13.1317 Social science teacher education	-	-	1	894	159	8	-
13.1318 Social studies teacher education	-	-	1	1,890	557	1	-
13.1319 Technical teacher education (vocational)	36	6	26	176	254	34	-
13.1320 Trade and industrial education (vocational)	1	5	61	974	433	51	-
13.1321 Computer teacher education	-	-	-	17	727	1	-
13.1322 Biology teacher education	-	-	-	333	124	-	-
13.1323 Chemistry teacher education	-	-	-	35	18	1	-
13.1324 Drama and dance teacher education	-	1	-	64	4	-	-
13.1325 French language teacher education	-	-	-	42	4	-	-
13.1326 German language teacher education	-	-	-	21	2	-	-
13.1327 Health occupations teacher education (vocational)	-	5	-	45	12	1	-
13.1328 History teacher education	-	-	3	467	25	-	-
13.1329 Physics teacher education	-	-	-	17	8	-	-
13.1330 Spanish language teacher education	-	-	-	249	39	-	-
13.1331 Speech teacher education	-	-	1	214	7	7	-
13.1399 Teacher education, specific academic and vocational programs, other	3	3	46	918	1,070	52	-
13.14 Teaching English as a second language/foreign language	353	5	12	101	1,705	10	-
13.15 Teacher assistant/aide	188	420	1,054	-	-	-	-
13.99 Education, other	176	2	1,675	1,121	3,147	174	-
14 Engineering	92	225	1,965	61,141	25,827	6,208	-
14.01 Engineering, general	12	25	1,309	1,937	1,237	224	-
14.02 Aerospace, aeronautical, and astronautical engineering	-	-	1	1,299	626	252	-
14.03 Agricultural engineering	1	-	-	648	168	84	-
14.04 Architectural engineering	-	-	20	486	27	1	-
14.05 Bioengineering and biomedical engineering	4	-	5	980	480	180	-
14.06 Ceramic sciences and engineering	-	-	-	184	61	49	-
14.07 Chemical engineering	1	-	7	6,695	1,146	651	-
14.08 Civil engineering	3	2	31	10,682	3,834	847	-
14.0801 Civil engineering, general	1	1	31	10,531	3,769	632	-
14.0802 Geotechnical engineering	-	-	-	-	-	-	-
14.0803 Structural engineering	-	-	-	-	-	-	-
14.0804 Transportation and highway engineering	-	-	-	-	14	-	-
14.0805 Water resources engineering	-	-	-	14	25	11	-
14.0899 Civil engineering, others	2	1	-	137	26	4	-
14.09 Computer engineering	-	-	20	2,826	938	124	-
14.10 Electrical, electronics, and communications engineering	1	159	284	13,339	6,428	1,504	-
14.11 Engineering mechanics	45	-	-	88	138	72	-
14.12 Engineering physics	-	-	-	284	56	45	-
14.13 Engineering science	-	4	55	259	300	55	-
14.14 Environmental/environmental health engineering	1	6	59	788	985	71	-
14.15 Geological engineering	-	-	1	172	60	10	-
14.16 Geophysical engineering	-	-	1	16	5	1	-
14.17 Industrial/manufacturing engineering	8	6	48	3,333	1,983	270	-
14.18 Materials engineering	-	-	5	484	463	382	-
14.19 Mechanical engineering	-	4	58	13,664	3,622	908	-
14.20 Metallurgical engineering	-	-	-	245	107	72	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
14.21	Mining and mineral engineering	1	-	-	140	50	33	-
14.22	Naval architecture and marine engineering	-	17	-	224	18	3	-
14.23	Nuclear engineering	-	-	2	161	185	113	-
14.24	Ocean engineering	-	-	-	141	97	35	-
14.25	Petroleum engineering	-	-	-	241	128	49	-
14.27	Systems engineering	-	-	-	364	513	36	-
14.28	Textile sciences and engineering	-	-	-	57	34	4	-
14.29	Engineering design	-	-	15	-	-	-	-
14.30	Engineering/industrial management	15	2	31	185	931	38	-
14.31	Materials science	-	-	-	155	90	89	-
14.32	Polymer/plastics engineering	-	-	-	41	69	22	-
14.99	Engineering, other	-	-	13	1,023	1,048	184	-
15.	Engineering-related technology	6,182	14,001	34,063	15,199	1,152	9	-
15.01	Architectural engineering technology	75	156	1,329	484	-	-	-
15.02	Civil engineering/civil technology	19	174	1,288	466	1	-	-
15.03	Electrical and electronic engineering-related technology	2,724	5,824	18,026	4,184	27	-	-
15.0301	Computer engineering technology/technician	993	1,225	1,482	330	20	-	-
15.0303	Electrical/electronic and communications engineering technology/technician	1,045	2,782	10,492	2,767	-	-	-
15.0304	Laser and optical technology/technician	2	70	129	8	2	-	-
15.0399	Electrical and electronic engineering-related technologies/technicians, other	684	1,747	5,923	1,079	5	-	-
15.04	Electromechanical instrumentation and maintenance technology	922	3,007	3,585	454	1	-	-
15.0401	Biomedical engineering-related technology/technician	25	48	462	15	-	-	-
15.0402	Computer maintenance technology/technician	730	1,727	1,450	-	-	-	-
15.0403	Electromechanical technology/technician	98	592	813	125	1	-	-
15.0404	Instrumentation technology/technician	16	435	362	4	-	-	-
15.0405	Robotics technology/technicians	41	110	400	303	-	-	-
15.0499	Electromechanical instrumentation and maintenance technologies/technicians, other	12	95	98	7	-	-	-
15.05	Environmental control technologies	1,427	2,947	1,967	259	163	-	-
15.0501	Heating, air conditioning, and refrigeration technology/technician	925	2,448	711	1	-	-	-
15.0503	Energy management and system technology/technician	-	3	38	26	5	-	-
15.0506	Water quality and wastewater treatment technology/technician	394	185	293	71	3	-	-
15.0507	Environmental and pollution control technology/technician	53	106	369	96	37	-	-
15.0599	Environmental control technologies/technicians, other	55	227	556	65	118	-	-
15.06	Industrial production technologies	204	536	1,687	3,834	285	6	-
15.0603	Industrial/manufacturing technology/technician	103	304	1,016	3,055	263	6	-
15.0607	Plastics technology/technician	58	63	133	162	-	-	-
15.0611	Metallurgical technology/technician	-	7	76	2	-	-	-
15.0699	Industrial production technologies/technicians, other	43	162	460	615	22	-	-
15.07	Quality control and safety technologies	184	267	590	492	340	-	-
15.0701	Occupational safety and health technology/technician	7	64	261	480	295	-	-
15.0702	Quality control technology/technician	172	199	293	10	39	-	-
15.0799	Quality control and safety technologies/technicians	5	4	36	2	6	-	-
15.08	Mechanical engineering-related technologies	287	588	3,455	1,703	-	-	-
15.0801	Aeronautical and aerospace engineering technology/technician	12	100	383	294	-	-	-
15.0803	Automotive engineering technology/technician	39	126	876	69	-	-	-
15.0805	Mechanical engineering/mechanical technology/technician	233	219	1,683	911	-	-	-
15.0899	Mechanical engineering-related technologies/technicians, other	3	141	513	429	-	-	-
15.09	Mining and petroleum technologies	247	21	111	12	-	-	-
15.0901	Mining technology/technician	-	4	20	-	-	-	-
15.0903	Petroleum technology/technician	247	17	90	12	-	-	-
15.0999	Mining and petroleum technologies/technicians, other	-	-	1	-	-	-	-
15.10	Construction/building technology	44	234	860	909	74	-	-
15.11	Miscellaneous engineering-related technologies	23	222	662	681	119	3	-
15.1101	Engineering-related technology/technician, general	-	33	391	490	88	-	-
15.1102	Surveying	15	100	234	191	31	3	-
15.1103	Hydraulic technology/technician	8	89	37	-	-	-	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
15.99	Engineering-related technologies/technicians, other	26	27	503	1,721	142	-	-
16.	Foreign languages and literatures	964	1,599	491	13,653	3,081	911	-
16.01	Foreign languages and literatures	30	34	159	1,498	994	265	-
16.0101	Foreign languages and literatures, general	16	30	159	921	333	61	-
16.0102	Linguistics	4	-	-	577	642	204	-
16.0103	Foreign language interpretation and translation	10	4	-	-	19	-	-
16.03	East and Southeast Asian languages and literatures	39	498	18	535	116	29	-
16.0301	Chinese language and literature	15	123	2	152	31	15	-
16.0302	Japanese language and literature	24	31	16	322	39	5	-
16.0399	East and Southeast Asian languages and literatures, other	-	344	-	61	46	9	-
16.04	East European languages and literatures	23	433	5	495	142	44	-
16.0402	Russian language and literature	23	424	5	450	46	9	-
16.0403	Slavic languages and literature (other than Russian)	-	9	-	31	88	34	-
16.0499	East European languages and literatures, other	-	-	-	14	8	1	-
16.05	Germanic languages and literatures	25	45	22	1,245	303	84	-
16.0501	German language and literature	25	45	22	1,215	279	80	-
16.0502	Scandinavian languages and literature	-	-	-	19	6	-	-
16.0599	Germanic languages and literatures, other	-	-	-	11	18	4	-
16.07	South Asian languages and literatures	-	10	-	7	6	2	-
16.09	Romance languages and literatures	778	10	280	8,981	1,226	383	-
16.0901	French language and literature	92	1	45	2,471	410	119	-
16.0902	Italian language and literature	26	-	1	231	49	18	-
16.0904	Portuguese language and literature	22	-	-	34	7	3	-
16.0905	Spanish language and literature	638	9	234	6,148	676	172	-
16.0999	Romance languages and literature, other	-	-	-	97	84	71	-
16.11	Middle Eastern languages and literatures	3	560	-	50	52	15	-
16.1101	Arabic language and literature	3	418	-	9	3	-	-
16.1102	Hebrew language and literature	-	28	-	12	24	4	-
16.1199	Middle Eastern languages and literatures, other	-	114	-	29	25	11	-
16.12	Classical and Ancient Near Eastern languages and literature	-	-	-	718	176	51	-
16.1201	Classics and classical languages and literatures	-	-	-	612	136	49	-
16.1202	Greek language and literature (Ancient and Medieval)	-	-	-	24	5	2	-
16.1203	Latin language and literature (Ancient and Medieval)	-	-	-	77	21	-	-
16.1299	Classical and Ancient Near Eastern languages and literatures, other	-	-	-	5	14	-	-
16.99	Foreign languages and literatures, other	66	3	7	124	66	38	-
19.	Home economics	851	200	983	16,080	2,838	382	-
19.01	Home economics, general	19	21	139	2,499	324	63	-
19.02	Home economics business services	-	-	-	123	2	-	-
19.0201	Business home economics	-	-	-	107	-	-	-
19.0202	Home economics communications	-	-	-	16	2	-	-
19.03	Family and community studies	59	1	6	375	69	2	-
19.04	Family/consumer resource management	31	1	11	1,113	110	21	-
19.0401	Family resource management studies	31	-	4	570	53	15	-
19.0402	Consumer economics and science	-	1	-	410	32	-	-
19.0499	Family/consumer resource management, other	-	-	7	133	25	6	-
19.05	Foods and nutrition studies	183	2	154	4,127	698	42	-
19.0501	Foods and nutrition studies, general	54	1	8	2,247	420	25	-
19.0502	Foods and nutrition science	-	-	-	133	56	3	-
19.0503	Dietetics/human nutritional services	13	1	146	1,669	166	11	-
19.0505	Food systems administration	116	-	-	23	10	1	-
19.0599	Foods and nutrition studies, other	-	-	-	55	46	2	-
19.06	Housing studies	-	-	2	456	24	3	-
19.0601	Housing studies, general	-	-	1	326	22	3	-
19.0603	Interior environments	-	-	1	41	-	-	-
19.0699	Housing studies, other	-	-	-	89	2	-	-
19.07	Individual and family development studies	559	171	566	6,037	1,508	230	-
19.0701	Individual and family development studies, general	4	3	134	4,622	382	82	-
19.0703	Family and marriage counseling	60	-	-	6	848	19	-
19.0704	Family life and relations studies	364	-	2	601	73	13	-
19.0705	Gerontological services	24	44	162	51	49	-	-
19.0706	Child growth, care and development studies	107	122	221	572	121	116	-
19.0799	Individual and family development studies, other	-	2	47	185	35	-	-
19.09	Clothing/apparel and textile studies	-	-	96	1,237	83	12	-
19.99	Home economics, other	-	4	9	113	20	9	-
20.	Vocational home economics	6,180	6,120	7,546	432	41	-	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
20.02	Child care and guidance workers and managers	3,212	3,890	5,613	158	38	-	-
20.0201	Child care and guidance workers and managers, general	1,193	2,352	3,168	141	37	-	-
20.0202	Child care provider/assistant	1,049	1,349	1,426	15	-	-	-
20.0203	Child care services manager	785	142	872	2	1	-	-
20.0299	Child care and guidance workers and managers, other	185	47	147	-	-	-	-
20.03	Clothing, apparel, and textiles workers and managers	157	998	252	21	1	-	-
20.0301	Clothing, apparel, and textiles workers and managers, general	63	307	56	17	1	-	-
20.0303	Commercial garment and apparel workers	43	402	80	-	-	-	-
20.0305	Custom tailor	14	173	3	-	-	-	-
20.0306	Fashion and fabric consultant	9	64	54	-	-	-	-
20.0399	Clothing, apparel, and textile workers and managers, other	28	52	59	4	-	-	-
20.04	Institutional food workers and administrators	2,098	677	1,292	217	2	-	-
20.0401	Institutional food workers and administrators, general	1,569	404	599	53	2	-	-
20.0404	Dietitian assistant	172	113	405	-	-	-	-
20.0405	Food caterer	44	7	-	-	-	-	-
20.0409	Institutional food services administrator	281	144	250	164	-	-	-
20.0499	Institutional food workers and administrators, other	32	9	38	-	-	-	-
20.05	Home furnishings and equipment installers and consultants	161	171	211	11	-	-	-
20.0501	Home furnishings and equipment installers and consultants, general	146	97	181	11	-	-	-
20.0502	Window treatment maker and installer	-	67	-	-	-	-	-
20.0599	Home furnishings and equipment installers and consultants, other	15	7	30	-	-	-	-
20.06	Custodial, housekeeping and home services workers and managers	404	202	32	1	-	-	-
20.0601	Custodial, housekeeping and home services workers and managers, general	33	87	-	1	-	-	-
20.0602	Elder care provider/companion	27	18	23	-	-	-	-
20.0604	Custodian/caretaker	317	51	6	-	-	-	-
20.0605	Executive housekeeper	317	51	6	-	-	-	-
20.0606	Homemaker's aide	-	-	-	-	-	-	-
20.0699	Custodial, housekeeping and home services workers and managers, other	-	45	-	-	-	-	-
20.99	Vocational home economics, other	148	182	146	24	-	-	-
22.	Law and legal studies	1,041	2,348	8,692	2,045	2,875	81	39,993
22.01	Law and legal studies	1,041	2,348	8,692	2,045	2,875	81	39,993
22.0101	Law (LL.B., J.D.)	-	-	-	-	-	-	39,993
22.0102	Pre-law studies	40	42	133	175	-	-	-
22.0103	Paralegal/legal assistant	982	2,237	8,443	1,132	41	-	-
22.0104	Juridical science/legal specialization (LL.M., M.C.L., J.S.D./S.J.D.)	-	-	-	-	1,754	67	-
22.0199	Law and legal studies, other	19	69	116	738	1,080	14	-
23.	English language and literature/letters	638	341	1,432	49,246	7,699	1,573	-
23.01	English language and literature, general	62	258	672	37,484	5,164	1,173	-
23.03	Comparative literature	7	-	563	710	235	144	-
23.04	English composition	-	-	3	293	19	4	-
23.05	English creative writing	5	-	5	1,042	1,069	9	-
23.07	American literature (United States)	-	-	5	25	8	15	-
23.08	English literature (British and Commonwealth)	-	-	1	1,165	224	33	-
23.10	Speech and rhetorical studies	87	4	167	7,127	702	135	-
23.11	English technical and business writing	437	14	10	199	166	-	-
23.99	English language and literature/letters, other	40	65	6	1,201	112	60	-
24.	Liberal arts and sciences, general studies and humanities	1,511	407	181,478	34,528	2,660	77	-
24.01	Liberal arts and sciences/liberal studies	1,511	407	181,478	34,528	2,660	77	-
24.0101	Liberal arts and sciences/liberal studies	89	103	140,847	21,851	1,699	20	-
24.0102	General studies	1,290	229	26,363	6,276	33	4	-
24.0103	Humanities/humanistic studies	1	12	5,736	2,541	556	48	-
24.0199	Liberal art and sciences, general studies and humanities, other	131	63	8,532	3,860	372	5	-
25.	Library science	108	69	126	48	5,010	46	-
25.01	Library science/librarianship	16	11	5	45	4,910	43	-
25.03	Library assistant	92	58	121	-	-	-	-
25.99	Library science, other	-	-	-	3	100	3	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles	Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
26. Biological sciences/life sciences	31	29	2,146	64,815	6,448	4,779	-
26.01 Biology, general	2	10	1,967	47,279	2,770	697	-
26.02 Biochemistry and biophysics	-	-	1	3,700	346	741	-
26.0202 Biochemistry	-	-	1	3,680	308	654	-
26.0203 Biophysics	-	-	-	20	38	87	-
26.03 Botany	-	-	3	392	216	243	-
26.0301 Botany, general	-	-	3	362	153	131	-
26.0306 Plant pathology	-	-	-	8	54	84	-
26.0307 Plant physiology	-	-	-	-	3	15	-
26.0399 Botany, other	-	-	-	22	6	13	-
26.04 Cell and molecular biology	-	-	-	2,333	206	583	-
26.0401 Cell biology	-	-	-	224	39	186	-
26.0402 Molecular biology	-	-	-	689	98	258	-
26.0499 Cell and molecular biology, other	-	-	-	1,420	69	139	-
26.05 Microbiology/bacteriology	4	-	8	2,535	313	449	-
26.06 Miscellaneous biological specializations	-	19	31	3,338	1,547	1,137	-
26.0601 Anatomy	-	-	-	57	52	55	-
26.0603 Ecology	-	-	4	937	248	100	-
26.0607 Marine/aquatic biology	-	-	1	788	140	33	-
26.0608 Neuroscience	-	-	-	294	57	215	-
26.0609 Nutritional sciences	-	-	-	449	429	94	-
26.0610 Parasitology	-	-	-	-	2	6	-
26.0611 Radiation biology/radiobiology	-	-	-	-	34	13	-
26.0612 Toxicology	-	-	4	58	68	100	-
26.0613 Genetics, plant and animal	-	-	-	264	134	245	-
26.0614 Biometrics	-	-	-	21	38	18	-
26.0615 Biostatistics	-	-	-	-	106	46	-
26.0616 Biotechnology research	-	19	2	64	122	1	-
26.0617 Evolutionary biology	-	-	-	-	12	11	-
26.0618 Biological immunology	-	-	-	-	7	33	-
26.0619 Virology	-	-	-	-	1	13	-
26.0699 Miscellaneous biological specializations, other	-	-	20	406	97	154	-
26.07 Zoology	25	-	13	3,532	872	796	-
26.0701 Zoology, general	-	-	9	2,810	231	145	-
26.0702 Entomology	25	-	-	85	151	128	-
26.0704 Pathology, human and animal	-	-	-	8	60	87	-
26.0705 Pharmacology, human and animal	-	-	-	80	90	242	-
26.0706 Physiology, human and animal	-	-	4	549	340	194	-
26.0799 Zoology, other	-	-	-	-	-	-	-
26.99 Biological sciences/life sciences, other	-	-	123	1,706	178	133	-
27. Mathematics	272	48	784	12,825	3,780	1,180	-
27.01 Mathematics	9	1	780	11,112	2,319	816	-
27.03 Applied mathematics	263	-	1	1,055	592	154	-
27.0301 Applied mathematics, general	-	-	1	596	313	114	-
27.0302 Operations research	-	-	-	419	279	40	-
27.0303 Applied mathematics, other	263	-	-	40	-	-	-
27.05 Mathematical statistics	-	-	1	365	796	190	-
27.99 Mathematics, other	-	47	2	293	73	20	-
29. Military technologies	-	-	556	4	-	-	-
30. Multi/interdisciplinary studies	385	127	9,184	26,328	2,826	451	-
30.01 Biological and physical sciences	-	1	5,880	2,938	308	30	-
30.05 Peace and conflict studies	-	16	-	73	122	2	-
30.06 Systems science and theory	-	-	-	97	166	8	-
30.08 Mathematics and computer science	-	-	1	243	2	6	-
30.10 Biopsychology	-	-	-	37	-	-	-
30.11 Gerontology	111	10	60	257	199	4	-
30.12 Historic preservation, conservation and architectural history	-	4	17	63	64	-	-
30.13 Medieval and renaissance studies	5	-	-	38	21	1	-
30.14 Museology/museum studies	3	-	4	5	107	-	-
30.15 Science, technology and society	12	4	6	106	19	5	-
30.99 Multi/interdisciplinary studies, other	254	92	3,216	22,471	1,818	395	-
31. Parks, recreation, leisure and fitness studies	101	172	893	15,426	1,957	105	-
31.01 Parks, recreation and leisure studies	22	4	123	2,283	257	13	-
31.03 Parks, recreation and leisure facilities management	10	65	269	2,927	232	10	-
31.05 Health and physical education/fitness	56	100	330	10,010	1,436	78	-
31.0501 Health and physical education, general	30	46	205	4,388	535	31	-
31.0502 Adapted physical education/therapeutic recreation	-	2	-	121	20	-	-
31.0503 Athletic training and sports medicine	-	12	25	1,040	73	-	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles	Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
31.0504 Sport and fitness administration/management	20	23	55	1,300	256	1	-
31.0505 Exercise sciences/physiology and movement studies	-	7	26	2,752	439	39	-
31.0506 Socio-psychological sports studies	-	-	-	10	7	-	-
31.0599 Health and physical education/fitness, other	6	7	19	399	106	7	-
31.99 Parks, recreation, leisure and fitness studies, other	13	3	171	206	32	4	-
38. Philosophy and religion	154	45	89	7,675	1,259	593	-
38.01 Philosophy	-	-	33	4,521	594	357	-
38.02 Religion/religious studies	154	40	53	2,831	527	228	-
38.99 Philosophy and religion	-	5	3	323	138	8	-
39. Theological studies and religious vocations	102	1,273	571	5,289	5,001	1,397	5,797
39.01 Biblical and other theological languages and literatures	-	-	-	49	43	5	-
39.02 Bible/biblical studies	2	909	296	1,728	302	37	-
39.03 Missions/missionary studies and misology	1	2	13	211	207	31	-
39.04 Religious education	71	163	129	824	861	45	-
39.05 Religious/sacred music	2	7	7	147	111	5	-
39.06 Theological and ministerial studies	2	160	107	1,779	2,565	922	5,797
39.0601 Theology/theological studies	-	124	88	1,085	2,179	714	-
39.0602 Divinity/ministry (B.D., M.Div.)	-	-	-	-	-	-	5,565
39.0603 Rabbinical and Talmudic studies (M.H.L./Rav)	-	-	-	-	-	-	232
39.0604 Pre-theological/Pre-ministerial studies	-	-	1	78	-	-	-
39.0606 Talmudic Studies	-	-	-	297	22	12	-
39.0699 Theological and ministerial studies, other	2	36	18	319	364	196	-
39.07 Pastoral counseling and specialized ministries	11	3	4	246	567	168	-
39.99 Theological studies and religious vocations, other	13	29	15	305	345	184	-
40. Physical sciences	15	24	1,694	19,691	5,559	4,471	-
40.01 Physical sciences, general	-	11	1,018	364	38	2	-
40.02 Astronomy	-	-	1	92	78	86	-
40.03 Astrophysics	-	-	-	48	15	13	-
40.04 Atmospheric sciences and meteorology	-	-	95	431	177	91	-
40.05 Chemistry	-	4	306	10,903	2,274	2,259	-
40.0501 Chemistry, general	-	4	305	10,464	2,138	2,064	-
40.0502 Analytical chemistry	-	-	-	-	17	17	-
40.0503 Inorganic chemistry	-	-	-	-	1	5	-
40.0504 Organic chemistry	-	-	-	13	15	9	-
40.0505 Medicinal/pharmaceutical chemistry	-	-	-	35	37	57	-
40.0506 Physical and theoretical chemistry	-	-	-	3	9	21	-
40.0507 Polymer chemistry	-	-	-	3	10	35	-
40.0599 Chemistry, other	-	-	1	385	47	51	-
40.06 Geological and related sciences	-	-	45	3,227	996	386	-
40.0601 Geology	-	-	45	2,960	849	296	-
40.0602 Geochemistry	-	-	-	12	8	8	-
40.0603 Geophysics and seismology	-	-	-	47	78	52	-
40.0604 Paleontology	-	-	-	-	1	1	-
40.0699 Geological and related sciences, other	-	-	-	208	60	29	-
40.07 Miscellaneous physical sciences	15	-	46	894	348	193	-
40.0701 Metallurgy	-	-	-	-	3	-	-
40.0702 Oceanography	15	-	45	205	113	102	-
40.0703 Earth and planetary science	-	-	-	599	149	74	-
40.0799 Miscellaneous physical sciences, other	-	-	1	90	83	17	-
40.08 Physics	-	9	91	3,386	1,502	1,416	-
40.0801 Physics, general	-	9	91	3,246	1,420	1,309	-
40.0802 Chemical and atomic/molecular physics	-	-	-	21	1	5	-
40.0804 Elementary particle physics	-	-	-	-	-	-	-
40.0805 Plasma and high-temperature physics	-	-	-	-	-	-	-
40.0806 Nuclear physics	-	-	-	-	2	3	-
40.0807 Optics	-	-	-	10	22	26	-
40.0809 Acoustics	-	-	-	-	-	-	-
40.0810 Theoretical and mathematical physics	-	-	-	8	-	-	-
40.0899 Physics, other	-	-	-	101	57	73	-
40.99 Physical sciences, other	-	-	92	346	131	25	-
41. Science technologies	91	113	816	207	32	7	-
41.01 Biological technology	23	24	160	47	8	1	-
41.02 Nuclear and industrial radiologic technologies	1	8	101	9	10	3	-
41.0204 Industrial radiologic technology/technician	1	-	20	1	-	-	-
41.0205 Nuclear/nuclear power technology/technician	-	8	81	-	10	3	-
41.0299 Nuclear and industrial radiologic technologies/technicians, other	-	-	-	8	-	-	-
41.03 Physical science technologies	53	76	434	39	-	-	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles	Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
41.0301 Chemical technology/technician	53	76	416	33	-	-	-
41.0399 Physical science technologies/technicians, other	-	-	18	6	-	-	-
41.99 Science technologies, other	14	5	121	112	14	3	-
42. Psychology	26	18	1,552	74,499	14,267	3,977	-
42.01 Psychology	-	3	1,386	69,980	4,755	1,540	-
42.02 Clinical psychology	-	-	-	71	1,466	1,547	-
42.03 Cognitive psychology and psycholinguistics	-	-	-	68	32	35	-
42.04 Community psychology	-	-	15	70	335	-	-
42.06 Counseling psychology	1	3	14	318	4,536	325	-
42.07 Developmental and child psychology	-	-	-	657	111	52	-
42.08 Experimental psychology	-	-	-	281	65	84	-
42.09 Industrial and organizational psychology	-	-	-	129	999	94	-
42.11 Physiological psychology/psychobiology	-	-	-	248	6	24	-
42.16 Social psychology	-	12	31	560	117	36	-
42.17 School psychology	-	-	2	-	809	117	-
42.99 Psychology, other	25	-	104	2,117	1,036	123	-
43. Protective services	15,398	5,051	19,792	25,494	1,861	29	-
43.01 Criminal justice and corrections	12,250	3,626	16,622	25,131	1,823	29	-
43.0102 Corrections/correctional administration	2,555	306	848	708	61	-	-
43.0103 Criminal justice/law enforcement administration	1,119	678	3,485	8,361	724	8	-
43.0104 Criminal justice studies	79	140	2,349	13,143	921	21	-
43.0106 Forensic technology/technician	2	-	5	40	60	-	-
43.0107 Law enforcement/police science	8,166	2,236	9,004	1,648	48	-	-
43.0109 Security and loss prevention services	167	84	490	41	1	-	-
43.0199 Criminal justice and corrections, other	162	182	441	1,190	8	-	-
43.02 Fire protection	3,087	1,300	2,563	352	28	-	-
43.0201 Fire protection and safety technology/technician	1,284	776	1,790	205	2	-	-
43.0202 Fire services administration	18	14	219	117	1	-	-
43.0203 Fire science/firefighting	1,784	510	538	19	-	-	-
43.0299 Fire protection, other	1	-	16	11	25	-	-
43.99 Protective services, other	61	125	607	11	10	-	-
44. Public administration and services	405	376	4,290	21,095	24,639	516	-
44.02 Community organization, resources and services	54	142	1,575	1,773	310	5	-
44.04 Public administration	36	10	55	2,437	7,588	127	-
44.05 Public policy analysis	-	-	20	408	976	103	-
44.07 Social work	74	47	1,559	15,804	15,281	271	-
44.99 Public administration and services, other	241	177	1,081	673	484	10	-
45. Social sciences and history	7	30	4,016	125,175	14,730	4,005	-
45.01 Social sciences, general	-	9	2,600	7,753	551	57	-
45.02 Anthropology	-	4	70	6,600	1,075	441	-
45.03 Archeology	2	12	7	136	36	11	-
45.04 Criminology	-	-	81	2,876	98	16	-
45.05 Demography/population studies	-	-	-	6	21	10	-
45.06 Economics	-	-	168	16,600	2,441	969	-
45.0601 Economics, general	-	-	168	16,041	2,151	941	-
45.0602 Applied and resource economics	-	-	-	143	110	8	-
45.0603 Econometrics and quantitative economics	-	-	-	30	2	-	-
45.0604 Development economics and international development	-	-	-	-	107	6	-
45.0605 International economics	-	-	-	136	62	4	-
45.0699 Economics, other	-	-	-	250	9	10	-
45.07 Geography	-	-	56	4,137	755	155	-
45.0701 Geography	-	-	33	4,091	754	155	-
45.0702 Cartography	-	-	23	46	1	-	-
45.08 History	-	3	298	25,149	2,886	832	-
45.0801 History, general	-	3	295	24,877	2,836	855	-
45.0802 American (United States) history	-	-	-	27	4	9	-
45.0803 European history	-	-	-	6	2	-	-
45.0804 History and philosophy of science and technology	-	-	-	31	18	12	-
45.0805 Public/applied history and archival administration	-	-	-	7	8	-	-
45.0899 History, other	-	-	3	201	18	6	-
45.09 International relations and affairs	4	-	20	5,160	2,392	47	-
45.10 Political science and government	-	1	158	29,034	1,911	687	-
45.1001 Political science, general	-	1	156	28,703	1,802	676	-
45.1002 American government and politics	-	-	-	19	85	-	-
45.1099 Political science and government, other	-	-	2	312	24	11	-
45.11 Sociology	-	-	490	24,707	1,730	593	-
45.12 Urban affairs/studies	-	-	13	655	331	53	-
45.99 Social sciences and history, other	1	1	55	2,362	503	84	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles	Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
46. Construction trades	6,335	8,011	1,909	104	-	-	-
46.01 Masons and tile setter	407	265	22	4	-	-	-
46.02 Carpenters	1,512	1,575	295	4	-	-	-
46.03 Electrical and power transmission installation	1,655	4,091	922	1	-	-	-
46.0301 Electrical and power transmission installation, general	144	126	100	-	-	-	-
46.0302 Electrician	1,497	3,640	740	1	-	-	-
46.0303 Lineworker	14	302	77	-	-	-	-
46.0399 Electrical and power transmission installation, other	-	23	5	-	-	-	-
46.04 Construction and building finishers and managers	1,073	1,140	310	93	-	-	-
46.0401 Building/property maintenance and manager	846	912	105	60	-	-	-
46.0403 Construction/building inspector	68	81	74	-	-	-	-
46.0408 Painter and wall coverer	7	29	-	-	-	-	-
46.0499 Construction and building finishers and managers, other	152	118	131	33	-	-	-
46.05 Plumbers and pipefitters	915	660	68	-	-	-	-
46.99 Construction trades, other	773	280	292	2	-	-	-
47. Mechanics and repairers	14,788	36,661	12,140	65	-	-	-
47.01 Electrical and electronics equipment installers and repairers	2,903	6,290	2,425	2	-	-	-
47.0101 Electrical and electronics equipment installer and repairer, general	923	2,455	1,232	-	-	-	-
47.0102 Business machine repairer	110	79	8	-	-	-	-
47.0103 Communications systems installer and repairer	72	300	135	-	-	-	-
47.0104 Computer installer and repairer	1,033	1,261	310	-	-	-	-
47.0105 Industrial electronics installer and repairer	468	1,206	673	-	-	-	-
47.0106 Major appliance installer and repairer	112	300	17	-	-	-	-
47.0199 Electrical and electronics equipment installer and repairer, other	185	689	50	2	-	-	-
47.02 Heating, air conditioning, and refrigeration mechanics and repairers	2,946	6,825	825	3	-	-	-
47.03 Industrial equipment maintenance and repairers	1,412	1,573	342	1	-	-	-
47.0302 Heavy equipment maintenance and repairer	58	380	76	-	-	-	-
47.0303 Industrial machinery maintenance and repairer	641	1,000	226	1	-	-	-
47.0399 Industrial equipment maintenance and repairers, other	713	193	40	-	-	-	-
47.04 Miscellaneous mechanics and repairers	136	482	261	-	-	-	-
47.0401 Instrument calibration and repairer	9	43	94	-	-	-	-
47.0402 Gunsmith	13	61	102	-	-	-	-
47.0403 Locksmith and safe repairer	-	46	-	-	-	-	-
47.0404 Musical instrument repairer	67	66	20	-	-	-	-
47.0408 Watch, clock and jewelry repairer	27	109	36	-	-	-	-
47.0499 Miscellaneous mechanics and repairers, other	20	157	9	-	-	-	-
47.05 Stationary energy sources installers and operators	74	80	8	-	-	-	-
47.06 Vehicle and mobile equipment mechanics and repairers	6,870	20,761	8,141	59	-	-	-
47.0603 Auto/Automotive body repairer	512	2,895	480	-	-	-	-
47.0604 Auto/Automotive mechanic/technician	3,711	10,420	3,539	34	-	-	-
47.0605 Diesel engine mechanics and repairer	390	2,697	844	9	-	-	-
47.0606 Small engine mechanic and repairer	384	391	7	-	-	-	-
47.0607 Aircraft mechanic/technician, airframe	668	939	1,476	6	-	-	-
47.0608 Aircraft mechanic/technician, powerplant	19	883	254	1	-	-	-
47.0609 Aviation systems and avionics maintenance technologist/technician	34	205	1,11[illegible]	9	-	-	-
47.0611 Motorcycle mechanic and repairer	1,014	189	-	-	-	-	-
47.0699 Vehicle and mobile equipment mechanics and repairers, other	136	2,142	4[illegible]7	-	-	-	-
47.99 Mechanics and repairers, other	447	650	136	-	-	-	-
48. Precision production trades	8,499	16,946	10,597	341	3	-	-
48.01 Drafting	1,736	5,593	7,669	181	-	-	-
48.0101 Drafting, general	1,055	3,075	4,777	132	-	-	-
48.0102 Architectural drafting	94	738	1,064	1	-	-	-
48.0103 Civil/structural drafting	12	75	37	-	-	-	-
48.0104 Electrical/electronics drafting	10	23	122	1	-	-	-
48.0105 Mechanical drafting	175	632	994	47	-	-	-
48.0199 Drafting, other	450	1,050	675	-	-	-	-
48.02 Graphic and printing equipment operators	1,240	1,537	1,169	138	-	-	-
48.0201 Graphic and printing equipment operators, general	279	746	829	123	-	-	-
48.0205 Mechanical typesetter and composer	240	8	9	-	-	-	-
48.0206 Lithographer and platemaker	48	16	42	-	-	-	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles	Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
48.0208 Printing press operator	13	226	60	-	-	-	-
48.0211 Computer typography and composition equipment operator	166	33	64	-	-	-	-
48.0212 Desktop publishing equipment operator	441	443	52	-	-	-	-
48.0299 Graphic and printing equipment operators, other	53	65	113	15	-	-	-
48.03 Leatherworkers and upholsterers	445	416	13	-	-	-	-
48.0303 Upholster	431	404	3	-	-	-	-
48.0304 Shoe, boot and leather repairer	-	6	-	-	-	-	-
48.0399 Leatherworkers and upholsterers, other	14	6	10	-	-	-	-
48.05 Precision metal workers	4,463	8,514	1,612	13	-	-	-
48.0501 Machinist/machine technologist	413	1,566	445	-	-	-	-
48.0503 Machine shop assistant	392	1,866	473	-	-	-	-
48.0506 Sheet metal workers	438	156	20	-	-	-	-
48.0507 Tool and die maker/technologist	149	340	304	10	-	-	-
48.0508 Welder/welding technologist	3,010	4,422	339	3	-	-	-
48.0599 Precision metal workers, other	61	164	31	-	-	-	-
48.07 Woodworkers	246	551	59	9	3	-	-
48.0701 Woodworkers, general	2	23	12	-	-	-	-
48.0702 Furniture designer and maker	82	28	15	9	3	-	-
48.0703 Cabinet maker and millworker	162	462	32	-	-	-	-
48.0799 Woodworkers, other	-	38	-	-	-	-	-
48.99 Precision production trades, other	309	335	75	-	-	-	-
49. Transportation and materials moving workers	21,339	1,545	1,599	3,500	924	-	-
49.01 Air transportation workers	1,937	511	1,280	3,381	899	-	-
49.0101 Aviation and airway science	7	12	341	1,798	-	-	-
49.0102 Aircraft pilot and navigator (professional)	894	70	534	808	837	-	-
49.0104 Aviation management	27	1	118	736	40	-	-
49.0105 Air traffic control	24	2	42	37	-	-	-
49.0106 Flight attendant	52	64	20	-	-	-	-
49.0107 Aircraft pilot (private)	4	-	4	-	-	-	-
49.0199 Air transportation workers, other	929	362	221	2	22	-	-
49.02 Vehicle and equipment operators	18,033	273	7	-	-	-	-
49.0202 Construction equipment operator	364	101	-	-	-	-	-
49.0205 Truck, bus and other commercial vehicle operators	17,104	139	2	-	-	-	-
49.0299 Vehicle and equipment operators, other	565	33	5	-	-	-	-
49.03 Water transportation workers	975	757	64	102	-	-	-
49.0303 Fishing technology/commercial fishing	92	-	-	-	-	-	-
49.0304 Diver (professional)	352	336	32	-	-	-	-
49.0306 Marine maintenance and ship repairer	201	371	28	-	-	-	-
49.0309 Marine science/merchant marine officer	330	16	2	102	-	-	-
49.0399 Water transportation workers, other	-	34	2	-	-	-	-
49.99 Transportation and material moving workers, other	394	4	248	17	25	-	-
50. Visual and performing arts	7,443	5,282	13,649	50,096	10,589	1,062	-
50.01 Visual and performing arts	-	48	407	1,355	71	1	-
50.02 Crafts, folk art and artisanry	-	9	1	109	14	-	-
50.03 Dance	7	15	78	954	186	12	-
50.04 Design and applied arts	1,038	3,307	9,365	8,056	593	-	-
50.0401 Design and visual communications	58	20	1,045	1,215	99	-	-
50.0402 Graphic design, commercial art and illustration	761	2,554	4,773	3,973	303	-	-
50.0404 Industrial design	-	5	385	761	23	-	-
50.0406 Commercial photography	56	153	471	4	-	-	-
50.0407 Fashion design and illustration	-	33	1,037	560	15	-	-
50.0408 Interior design	20	388	1,317	1,266	62	-	-
50.0499 Design and applied arts, other	143	154	337	277	91	-	-
50.05 Dramatic/theater arts and stagecraft	149	425	333	6,402	1,450	96	-
50.0501 Drama/theater arts, general	-	110	319	6,008	1,291	96	-
50.0502 Technical theater/theater design and stagecraft	-	7	14	122	29	-	-
50.0503 Acting and directing	149	80	-	163	107	-	-
50.0504 Playwriting and screenwriting	-	-	-	3	1	-	-
50.0505 Drama/theater literature, history and criticism	-	-	-	14	-	-	-
50.0599 Dramatic/theater arts and stagecraft, other	-	228	-	92	22	-	-
50.06 Film/video and photographic arts	216	346	627	2,944	655	21	-
50.0601 Film/cinema studies	10	-	-	683	98	2	-
50.0602 Film-video making/cinematography and production	12	117	181	1,091	379	15	-
50.0605 Photography	143	205	316	833	155	4	-
50.0699 Film/video and photographic arts, other	51	24	130	337	23	-	-
50.07 Fine arts and art studies	5,630	93	1,485	20,613	3,361	180	-
50.0701 Art, general	2	17	933	11,400	1,024	26	-
50.0702 Fine/studio arts	-	9	41	1,808	303	6	-
50.0703 Art history, criticism and conservation	-	-	60	4,183	897	145	-
50.0704 Arts management	-	1	-	70	166	-	-
50.0705 Drawing	-	4	13	184	33	-	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
50.0706	Intermedia	9	9	354	117	11	-	-
50.0708	Painting	2	29	-	761	207	-	-
50.0709	Sculpture	-	8	1	228	67	-	-
50.0710	Printmaking	1	3	-	98	38	-	-
50.0711	Ceramics arts ant ceramics	-	2	2	212	58	-	-
50.0712	Fiber, textile and weaving arts	-	1	1	109	39	1	-
50.0713	Metal and jewelry arts	5,615	4	11	76	27	-	-
50.0799	Fine arts and art studies, other	1	6	69	1,367	491	2	-
50.09	Music	374	1,035	1,190	9,157	3,831	712	-
50.0901	Music, general	3	49	395	4,630	1,202	318	-
50.0902	Music history and literature	-	-	-	61	57	33	-
50.0903	Music-general performance	20	451	72	2,894	1,890	249	-
50.0904	Music theory and composition	-	32	7	305	185	47	-
50.0905	Musicology and ethnomusicology	-	-	-	12	30	3	-
50.0906	Music conducting	-	-	-	5	54	14	-
50.0907	Music-piano and organ performance	-	1	3	93	84	9	-
50.0908	Music-voice and choral/opera performance	-	-	-	158	107	4	-
50.0909	Music business management and merchandising	-	-	478	362	-	-	-
50.0999	Music, other	351	502	235	637	222	35	-
50.99	Visual and performing arts, other	29	4	163	506	428	40	-
51.	Health professions and related sciences	78,154	83,920	99,275	86,388	36,150	2,676	31,968
51.01	Chiropractic (D.C., D.C.M.)	-	-	-	-	-	-	3,654
51.02	Communication disorders sciences and services	143	132	540	6,755	5,453	97	-
51.0201	Communication disorders, general	-	-	12	1,657	1,044	14	-
51.0202	Audiology/hearing sciences	-	-	-	105	169	2	-
51.0203	Speech-language pathology	-	-	-	979	1,180	8	-
51.0204	Speech-language pathology and audiology	-	-	-	3,879	2,927	68	-
51.0205	Sign language interpreter	143	132	516	60	6	-	-
51.0299	Communication disorders sciences and services, other	-	-	12	75	127	5	-
51.03	Community health services	14	36	202	770	199	-	-
51.04	Dentistry (D.D.S., D.M.D.)	-	-	-	-	-	-	3,805
51.05	Dental clinical science/graduate dentistry (M.S., Ph.D.)	-	-	-	-	407	32	-
51.06	Dental services	4,539	5,750	4,912	924	36	-	-
51.0601	Dental assistant	4,240	5,049	632	-	-	-	-
51.0602	Dental hygienist	12	277	4,041	918	9	-	-
51.0603	Dental laboratory technician	137	412	233	2	2	-	-
51.0699	Dental services, other	150	12	6	4	25	-	-
51.07	Health and medical administrative services	7,199	4,284	3,248	4,386	3,805	58	-
51.0701	Health system/health services administration	18	131	110	2,374	2,187	34	-
51.0702	Hospital/health facilities administration	-	2	7	1,038	1,484	4	-
51.0703	Health unit coordinator/ward clerk	734	242	6	-	-	-	-
51.0704	Health unit coordinator/ward supervisor	43	-	6	-	-	-	-
51.0705	Medical office management	1,503	557	337	-	4	-	-
51.0706	Medical records administration	561	189	82	750	7	-	-
51.0707	Medical records technology/technician	563	863	2,110	1	4	4	-
51.0708	Medical transcription	667	1,613	196	-	-	-	-
51.0799	Health and medical administrative services, other	3,110	687	394	223	119	16	-
51.08	Health and medical assistants	24,576	15,891	14,363	1,653	558	-	-
51.0801	Medical assistant	21,366	13,529	5,024	-	-	-	-
51.0802	Medical laboratory assistant	605	107	61	84	19	-	-
51.0803	Occupational therapy assistant	1	74	2,657	-	-	-	-
51.0804	Ophthalmic medical assistant	22	37	20	-	-	-	-
51.0805	Pharmacy technician/assistant	817	1,166	324	-	-	-	-
51.0806	Physical therapy assistant	144	95	4,765	38	-	-	-
51.0807	Physician assistant	52	189	163	1,412	516	-	-
51.0808	Veterinarian assistant/animal health technician	281	308	1,224	94	-	-	-
51.0899	Health and medical assistants, other	1,288	386	125	25	23	-	-
51.09	Health and medical diagnostic and treatment services	11,624	12,676	12,461	1,827	36	2	-
51.0901	Cardiovascular technology/technician	18	1,027	237	53	-	-	-
51.0902	Electrocardiograph technology/technician	256	241	64	-	-	-	-
51.0903	Electroencephalograph technology/technician	63	6	35	1	-	-	-
51.0904	Emergency medical technology/technician	9,976	2,979	1,065	59	9	-	-
51.0905	Nuclear medical technology/technician	6	130	316	192	-	-	-
51.0906	Perfusion technology/technician	4	15	-	19	4	-	-
51.0907	Medical radiologic technology/technician	610	1,903	5,992	806	16	-	-
51.0908	Respiratory therapy technician	125	2,242	3,646	508	-	-	-
51.0909	Surgical/operating room technician	156	2,962	632	-	-	-	-
51.0910	Diagnostic medical sonography	189	820	283	43	-	-	-
51.0999	Health and medical diagnostic and treatment services, other	221	351	191	148	7	2	-
51.10	Health and medical laboratory technologies	1,524	929	2,777	2,995	513	89	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First profes-sional degrees
51.1001	Blood bank technology/technician	286	11	-	22	1	-	-
51.1002	Cytotechnologist	-	49	-	119	5	-	-
51.1003	Hematology technology/technician	16	14	5	-	-	-	-
51.1004	Medical laboratory technician	303	695	2,624	137	2	-	-
51.1005	Medical technology	11	34	30	2,533	75	-	-
51.1006	Optometric/ophthalmic laboratory technician	22	8	15	-	-	-	-
51.1099	Health and medical laboratory technologies/technicians, other	886	118	103	184	430	89	-
51.11	Health and medical preparatory program	43	24	744	1,506	64	61	-
51.1101	Pre-dentistry studies	-	-	31	127	-	-	-
51.1102	Pre-medicine studies	-	-	295	701	-	-	-
51.1103	Pre-pharmacy studies	-	-	89	1	-	-	-
51.1104	Pre-veterinary studies	-	-	57	276	-	-	-
51.1199	Health and medical preparatory programs, other	43	24	272	401	64	61	-
51.12	Medicine (M.D.)	-	-	-	-	-	-	15,616
51.13	Medical basic sciences	-	-	17	452	548	477	-
51.1301	Medical anatomy	-	-	-	-	10	31	-
51.1302	Medical biochemistry	-	-	-	8	12	61	-
51.1304	Medical physics/biophysics	-	-	-	2	22	5	-
51.1305	Medical cell biology	-	-	-	16	2	17	-
51.1306	Medical genetics	-	-	-	3	26	13	-
51.1307	Medical immunology	-	-	-	-	6	33	-
51.1308	Medical microbiology	-	-	-	113	23	72	-
51.1309	Medical molecular biology	-	-	-	-	6	13	-
51.1310	Medical neurobiology	-	-	-	-	4	27	-
51.1311	Medical nutrition	-	-	-	-	27	-	-
51.1312	Medical pathology	-	-	-	-	16	18	-
51.1313	Medical physiology	-	-	14	-	53	36	-
51.1314	Medical toxicology	-	-	-	12	3	10	-
51.1399	Medical basic sciences, other	-	-	3	298	338	141	-
51.14	Medical clinical sciences (M.S., Ph.D.)	-	-	-	-	52	45	-
51.15	Mental health services	2,110	1,310	3,380	537	423	1	-
51.1501	Alcohol/drug abuse counseling	247	769	854	83	64	-	-
51.1502	Psychiatric/mental health services technician	108	403	1,845	111	31	-	-
51.1503	Clinical and medical social work	24	10	14	114	68	-	-
51.1599	Mental health services, other	1,731	128	667	229	260	1	-
51.16	Nursing	22,445	40,765	53,871	45,275	11,664	488	-
51.1601	Nursing (R.N. training)	493	5,716	52,237	40,583	4,982	277	-
51.1602	Nursing administration (post-R.N.)	-	-	27	301	550	-	-
51.1603	Nursing, adult health (post-R.N.)	-	4	-	154	257	-	-
51.1604	Nursing anesthetist (post-R.N.)	-	-	-	-	595	-	-
51.1605	Nursing, family practice (post-R.N.)	-	-	8	-	443	-	-
51.1606	Nursing, maternal/child health (post-R.N.)	-	-	11	-	343	-	-
51.1607	Nursing midwifery (post-R.N.)	-	-	-	-	71	-	-
51.1608	Nursing science (post-R.N.)	-	-	1	1,568	1,011	131	-
51.1609	Nursing, pediatric (post-R.N.)	-	-	-	-	45	-	-
51.1610	Nursing, psychiatric/mental health (post-R.N.)	-	-	-	-	125	-	-
51.1611	Nursing, public health (post-R.N.)	-	-	-	-	315	7	-
51.1612	Nursing, surgical (post-R.N.)	43	-	-	-	129	-	-
51.1613	Practical nurse (L.P.N. training)	946	32,829	733	42	1	-	-
51.1614	Nurse assistant/aide	16,705	1,061	12	-	-	-	-
51.1615	Home health aide	1,474	202	94	-	-	-	-
51.1699	Nursing, other	2,784	953	748	2,627	2,797	73	-
51.17	Optometry (O.D.)	-	-	-	-	-	-	1,295
51.18	Ophthalmic/optometric services	470	165	514	165	8	2	-
51.1801	Opticianry/Dispensing optician	143	41	215	-	-	-	-
51.1802	Optical technician/assistant	310	113	248	-	-	-	-
51.1803	Ophthalmic medical technologist	17	5	40	2	-	-	-
51.1899	Ophthalmic/optometric services, other	-	6	13	163	8	2	-
51.19	Osteopathic medicine (D.O.)	-	-	-	-	-	-	2,011
51.20	Pharmacy	18	26	54	5,889	292	307	2,702
51.2001	Pharmacy (B.Pharm., Pharm.D.)	-	-	-	5,496	-	-	2,702
51.2002	Pharmacy administration and pharmaceutics	-	-	47	-	45	26	-
51.2003	Medical pharmacology and pharmaceutical science	18	-	-	71	94	130	-
51.2099	Pharmacy, other	-	26	7	322	153	151	-
51.21	Podiatry (D.P.M., D.P., Pod.D.)	-	-	-	-	-	-	614
51.22	Public health	45	91	199	1,480	3,872	339	-
51.2201	Public health, general	38	66	63	608	2,333	108	-
51.2202	Environmental health	-	-	53	460	267	46	-
51.2203	Epidemiology	-	-	-	-	413	100	-
51.2204	Health and medical biostatistics	-	-	-	-	9	6	-
51.2205	Health physics/radiologic health	1	-	10	5	24	-	-
51.2206	Occupational health and industrial hygiene	6	11	72	77	75	4	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First profes-sional degrees
51.2207	Public health education and promotion	-	14	-	161	329	11	-
51.2299	Public health, other	-	-	1	169	422	64	-
51.23	Rehabilitation/therapeutic services	200	419	958	8,493	6,493	92	-
51.2301	Art therapy	-	1	-	85	179	-	-
51.2302	Dance therapy	-	-	-	1	21	-	-
51.2303	Hypnotherapy	54	-	-	-	-	-	-
51.2304	Movement therapy	-	1	7	-	9	-	-
51.2305	Music therapy	2	-	-	212	57	-	-
51.2306	Occupational therapy	-	1	387	3,508	1,251	9	-
51.2307	Orthotics/prosthetics	-	37	32	26	-	-	-
51.2308	Physical therapy	17	3	384	3,119	3,940	59	-
51.2309	Recreational therapy	44	35	72	201	11	-	-
51.2310	Vocational rehabilitation counseling	-	14	10	275	660	8	-
51.2399	Rehabilitation/therapeutic services, other	83	327	66	1,066	365	16	-
51.24	Veterinary medicine (D.V.M.)	-	-	-	-	-	-	2,188
51.25	Veterinary clinical sciences (M.S., Ph.D.)	-	-	-	-	175	126	-
51.26	Miscellaneous health aides	1,428	81	70	1	-	-	-
51.27	Miscellaneous health professions	-	68	19	53	566	360	83
51.2701	Acupuncture and oriental medicine	-	68	-	5	512	359	-
51.2702	Medical dietitian	-	-	19	21	14	-	-
51.2703	Medical illustrating	-	-	-	27	40	1	-
51.2704	Naturopathic medicine	-	-	-	-	-	-	83
51.2705	Psychoanalysis	-	-	-	-	-	-	-
51.99	Health professions and related sciences, other	1,776	1,273	946	3,227	986	100	-
52	Business management and administrative services	54,527	47,353	96,224	226,668	96,085	1,346	-
52.01	Business	1,070	1,309	11,295	21,889	10,398	204	-
52.02	Business administration and management	6,796	4,660	30,074	85,885	57,622	725	-
52.0201	Business administration and management, general	1,250	3,702	25,744	78,638	53,041	702	-
52.0202	Purchasing, procurement and contracts management	150	8	95	264	376	-	-
52.0203	Logistics and materials management	164	34	618	624	161	-	-
52.0204	Office supervision and management	252	611	1,969	698	1	-	-
52.0205	Operations management and supervision	476	125	650	1,942	1,126	10	-
52.0206	Non-profit and public management	11	-	6	58	49	-	-
52.0299	Business administration and management, other	4,493	180	992	3,661	2,868	13	-
52.03	Accounting	4,136	6,435	16,018	41,723	4,469	56	-
52.0301	Accounting	1,233	2,184	7,142	41,461	4,344	54	-
52.0302	Accounting technician	2,110	3,439	8,592	46	1	-	-
52.0399	Accounting, other	793	812	284	216	124	2	-
52.04	Administrative and secretarial services	21,451	27,440	20,750	1,023	-	-	-
52.0401	Administrative assistant/secretarial science, general	5,929	9,970	10,713	733	-	-	-
52.0402	Executive assistant/secretary	897	1,183	2,799	77	-	-	-
52.0403	Legal administrative assistant/secretary	719	1,981	1,755	25	-	-	-
52.0404	Medical administrative assistant/secretary	3,790	4,786	3,110	-	-	-	-
52.0405	Court reporter	34	736	489	17	-	-	-
52.0406	Receptionist	148	122	13	-	-	-	-
52.0407	Information processing/data entry technician	4,150	1,478	846	42	-	-	-
52.0408	General office/clerical and typing services	4,584	5,692	578	42	-	-	-
52.0499	Administrative and secretarial services, other	1,200	1,492	447	87	-	-	-
52.05	Business communications	38	56	1	153	97	-	-
52.06	Business/managerial economics	7	5	17	2,726	205	45	-
52.07	Enterprise management and operation	53	165	285	489	173	-	-
52.0701	Enterprise management and operation, general	46	160	204	487	173	-	-
52.0702	Franchise operation	-	-	-	-	-	-	-
52.0799	Enterprise management operation, other	7	5	81	2	-	-	-
52.08	Financial management and services	881	551	945	21,743	6,099	54	-
52.0801	Finance, general	189	62	428	20,174	5,289	48	-
52.0802	Actuarial science	-	-	1	249	64	-	-
52.0803	Banking and financial support services	648	418	442	300	247	2	-
52.0804	Financial planning	-	7	5	18	41	-	-
52.0805	Insurance and risk management	1	31	5	462	45	3	-
52.0806	International finance	-	-	-	2	-	1	-
52.0807	Investments and securities	-	-	7	359	378	-	-
52.0808	Public finance	-	-	-	-	-	-	-
52.0899	Financial management and services, other	43	33	57	179	35	-	-
52.09	Hospitality services management	2,171	847	3,292	5,469	426	10	-
52.0901	Hospitality/administration management	10	52	290	1,489	256	-	-
52.0902	Hotel/motel and restaurant management	245	151	1,904	3,215	109	10	-
52.0903	Travel-tourism management	1,770	626	751	314	57	-	-
52.0999	Hospitality services management, other	146	18	347	451	4	-	-
52.10	Human resources management	332	623	1,041	8,407	3,631	88	-
52.1001	Human resources management	289	167	838	5,628	2,363	26	-

Table 11. Earned awards and degrees, by field of study, 1996-97 — Continued

Classification of Instructional Programs (CIP) codes and titles		Awards, curriculums of under 1 year	1- to 4- year awards	Associate degrees	Bachelor's degrees requiring 4 or 5 years	Master's degrees	Doctoral degrees	First professional degrees
52.1002	Labor/personnel relations and studies	2	406	101	950	644	23	-
52.1003	Organizational behavior studies	-	-	1	1,417	400	39	-
52.1099	Human resources management, other	41	50	101	412	224	-	-
52.11	International business	59	46	138	3,019	2,039	17	-
52.12	Business information and data processing services	7,088	4,222	8,506	7,320	2,661	16	-
52.1201	Management information systems and business data processing, general	1,533	871	3,793	6,527	2,058	16	-
52.1202	Business computer programming/programmer	1,699	684	2,422	63	-	-	-
52.1203	Business systems analysis and design	9	100	329	143	33	-	-
52.1204	Business systems networking and telecommunications	621	320	536	418	382	-	-
52.1205	Business computer facilities operator	2,245	684	238	36	-	-	-
52.1299	Business information and data processing services, other	981	1,563	1,188	133	188	-	-
52.13	Business quantitative methods and management science	9	22	77	1,777	1,075	33	-
52.1301	Management science	9	22	76	1,218	708	24	-
52.1302	Business statistics	-	-	-	24	24	4	-
52.1399	Business quantitative methods and management science	-	-	1	535	343	5	-
52.14	Marketing management and research	126	173	1,498	21,237	1,875	46	-
52.1401	Business marketing and marketing management	85	119	1,354	20,167	1,520	42	-
52.1402	Marketing research	-	-	-	99	91	-	-
52.1403	International business marketing	41	42	86	24	75	-	-
52.1499	Marketing management and research, other	-	12	58	947	189	4	-
52.15	Real estate	1,344	109	281	362	180	3	-
52.16	Taxation	2,547	5	1	-	1,708	-	-
52.99	Business management and administrative services, other	6,419	685	2,005	3,446	3,427	49	-
95.	Field of study not reported	422	74	219	-	-	-	-

Appendix. Sources of State and Local Job Outlook Information

State and local job market and career information is available from State employment security agencies. These agencies develop detailed information about local labor markets, such as current and projected employment by occupation and industry, characteristics of the work force, and changes in State and local area economic activity. Listed below are addresses, telephone numbers, and, in most cases, Internet addresses of the directors of research and analysis in these agencies.

Most States have career information delivery systems (CIDS). Look for these systems in secondary schools, postsecondary institutions, libraries, job training sites, vocational rehabilitation centers, and employment service offices. The public can use the systems' computers, printed material, microfiche, and toll-free hotlines to obtain information on occupations, educational opportunities, student financial aid, apprenticeships, and military careers. Ask counselors for specific locations.

State occupational projections are also available on the Internet at: **http://www.dws.state.ut.us/bls**

Alabama
Chief, Labor Market Information, Alabama Department of Industrial Relations, 649 Monroe St., Room 422, Montgomery, AL 36130. Phone: (334) 242-8800. Internet: **http://www.dir.state.al.us/lmi**

Alaska
Chief, Research and Analysis, Alaska Department of Labor, P.O. Box 25501, Juneau, AK 99802-5501. Phone: (907) 465-4500. Internet: **http://www.labor.state.ak.us**

rizona
Research Administrator, Arizona Department of Economic Security, P.O. Box 6123, Site Code 733A, Phoenix, AZ 85005. Phone: (602) 542-3871. Internet: **http://www.de.state.az.us/links/economic/webpage/page(.html**

Arkansas
Labor Market Information Director, Arkansas Employment Security Department, P.O. Box 2981, Little Rock, AR 72203-2981. Phone: (501) 682-3159. Internet: **http://www.state.ar.us/esd**

California
Chief, Labor Market Information Division, California Employment Development Department, P.O. Box 826880, MIC 57, Sacramento, CA 94280-0001. Phone: (916) 262-2160. Internet: **http://www.calmis.cahwnet.gov**

Colorado
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